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GAS JOURNAL

LIGHT • HEAT • POWER • BYE-PRODUCTS

[Founded in 1849 as the "Journal of Gas Lighting."]

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EDITOR & PUBLISHER: WALTER KING. OFFICE: 11, BOLT COURT, FLEET ST., LONDON, E.C. 4.

VOL. CXL., No. 2841.] TUESDAY, OCTOBER 23, 1917. [69TH YEAR.

EDITORIAL NOTES.

The Fundamental Work of the Board of Fuel Research.

WHILE in the "JOURNAL" last week there were many other topics of considerable temporary and incidental importance to the gas industry, there was no matter of greater permanent significance than the report of the Board of Fuel Research on the lines they propose to take in their initial work, and on the problems they have either set out to solve, or, after investigation, to pronounce an opinion upon. That Sir George Beilby, F.R.S. (the Director), and his colleagues have put a due valuation upon the objects for which they were appointed is seen in all parts of the report; for every line speaks of comprehensive intention and of systematic pursuit. They are attacking the work of making the best possible use of our coal resources from the national point of view. It is seen that they are already convinced that the economic service of the country in this regard must not be studied as though the operations of any particular industry, or the issues of the application of any particular process, were confined within a water-tight compartment; but it must be investigated as a whole, with the view of realizing the largest ultimate advantage in results. In this matter of fuel use, industries are interdependent; in the matter of their requirements, there is interconnection. Gas is required for light, heat, and power in the home and industry; electricity is needed for light and power, and in a comparatively small way for heating; liquid fuel is required for the Navy; products of coal carbonization are necessary to the existence of colour and dye industries; products from the same source are needed for explosives making; agriculture requires artificial fertilizers; and industries and the country generally need other of the substances from coal.

It is a very big work the Board have had confided to them; and nothing that has not yet been absolutely proved is going to be taken by them for granted. Even the economic claims of the low-temperature carbonization enthusiasts, and the notions of the electrical theorists who are looking to coal carbonization as their primary work in electrical generation without considering ulterior effects, are to have claims and notions put into the scale, and weighed from the national standpoint. We have it laid down by the Board as a cardinal principle that no new carbonization system can be justified economically if it can only live by poaching upon the preserves of existing industries. They realize, too, that it is possible the net results of this particular inquiry may be to show that, purely as a means of cheapening the cost of electric power, the use of carbonizing methods has not much to commend it, but that certain incidental advantages will justify their use in particular cases. The plausible statements and estimates that have been made regarding this particular matter, the Board find, have a very slender foundation of knowledge and experience. Even now electrical engineers are debating among themselves as to whether the transmission of coal or gas from the colliery would not be cheaper than electrical transmission. They do not know —in fact, all their schemes in these directions are cloaked in glorious uncertainty. In considering new and expensive schemes of carbonization, it is necessary to take into account the yields in relation to capital and working expenditure, and the outlets for all the products, and the best use that can be made of them. It is no use having a good outlet for (say) liquid products, and wastefully employ the gas, and find the coke a drug on the market. The highest economic situation can only be attained by complete absorption of the products. For the electrical industry, coal carbonization as an integral part of their system might mean not only a detriment to other established industries, but the imposition of a load upon itself which would be the reverse of economical. But coal carbonization stands at the head and front of the Board's inquiry, having regard to the dual consideration of fuel economy and the country's many other requirements. These requirements are to be investigated; and the possibilities of one or more industries being the gaseous or smokeless fuel suppliers to other industries (so promoting interconnection of vast importance and potentiality), will not be overlooked. The part or whole transfer of coal from the household grate and the industrial boiler or furnace to the carbonization system or systems points the way of likely development. The gas industry already occupies the high road in this respect; its cognate, the coking industry, has its limitations set by the demand for metallurgical coke. The three to four million gas-cookers now in use in the United Kingdom, the large growth of the domestic gas-fire, and the considerable utilization of gas in industry, tell a tale of the enormous transfer of coal that has already taken place from domestic and industrial use to gas-retorts, but which transfer has been lessened by the advancing efficiency of the gas-producing processes in gas-works, which has given a larger yield per ton.

It is a vast task that has been confided to the Board, and which they have undertaken. From the first, the composition of the Board, the high scientific attainments of the members and of their consultant (Prof. William A. Bone, F.R.S.), gave every confidence that the inquiry would be a thorough one; and, after reading the report published by us last week [p. 128], the confidence is hardened. The gas industry, however, though praised for the efficiency that has been achieved so far in its manufacturing processes, does not come out of the preliminary investigation without mild stricture upon the utilization of its gas for heating purposes. We have prided ourselves upon a good advance. But our gas-furnaces are not yet all they should be; and the question is, "Can the use of gaseous fuel in industrial operations be forwarded by the development of more scientific methods of combustion in furnaces, muffles, and ovens used in metallurgical, ceramic, and chemical operations?" And, again, "the actual practice of gas heating still lags a long way behind the ideals of economy and efficiency; and there is room for much useful experimental inquiry into principles and methods." No mention is seen in the report as to the reference to the Board by the Board of Trade of the question of the composition of town gas; but there is plenty of indication that, from the fundamental work, much else is to branch out. This is manifest in the completeness of the gas plant, laboratory, and test-rooms that will form the research station at the East Greenwich works of the South Metropolitan Gas Company, where different representative grades of coal from all parts of the country will in due time be treated, where processes will be examined, and where developments upon existing carbonizing practices and gas production will be subjected to close investigation. But the Board hope that all this will not act as a deterrent to the work of individual explorers, or to the co-operative research efforts of technical organizations. They desire it all to go on; and they want the results. Such external and independent work is all valuable and suggestive. The problems are great; the issues far-reaching. The country is to be, and can be, economically benefited through coal carbonization; it can be made more self-dependent, and be very largely relieved from its present reliance upon overseas supplies of various necessaries. Any expenditure through the Board will be nationally and permanently profitable.

In this report, sketching the fundamental work, there is good augury for the country generally, and particularly, we hope and believe, for the gas industry.

The Gas Acts for 1917.

IN last week's "JOURNAL," allusion was made to the influence that Railway Companies are jointly having upon gas legislation, and in some respects unfairly so. The comments arose, in part, in connection with the preferential treatment in respect of minimum pressures demanded by the companies—it being seen that they are securing the right in individual Acts to a pressure of 20-10ths at their primary meter or meters, while 15-10ths is the new general minimum pressure. The Gas Acts for the session (the low number of which is a record over a long terms of years) are reviewed elsewhere this week. Beyond the point mentioned, there is little else of a notable character in the measures. It is observed that the relaxation of capital-raising powers has been proceeding. The Sheffield Gas Company have, among other concerns, obtained greater elasticity in this regard, partly by means of redeemable preference shares and stock or debenture stock. But in all cases, except in that of the Lea Bridge Gas Company, the conditions applying to the issue of redeemable shares or stock are those that were determined by the Private Bill Authorities in the session of 1916. With regard to Lea Bridge, they have been fortunate (where other companies have not been so) in obtaining a clause which enacts that "the provisions of the Statu- "tory Companies (Redeemable Stock) Act, 1915, shall ex- "tend and apply to the Company as if any preference or "debenture stock which the Company is authorized to raise "under the powers of this Act were such preference or "debenture stock as is referred to in Section 1 of the said "Act of 1915." The Hemel Hempsted Company failed to secure the clause; and the South Metropolitan Company and other gas companies were also unsuccessful in obtaining a clause last year placing the issue of redeemable stock under the powers of the Act—it being then ruled that gas undertakings did not come under the Act. We see, too, the Private Bill Authorities are perpetuating the one-third restriction injustice in respect of the purchase of secondary products, by placing it upon all gas undertakings without distinction, where the powers in a measure make it possible. We have previously called attention to the ridiculous prohibition of the distribution for lighting purposes of coke-oven gas that was put upon the Sheffield Gas Company by a House of Commons Committee. We believe it is under contemplation that an application shall be made to reverse the decision. But whether it has yet been definitely determined by the Directors, cannot be said.

Economical Gas for Manufacture and Supply.

THOSE of the members of the Scottish Junior Gas Association (Eastern District) who attended their meeting last Saturday in the expectation of hearing from Mr. W. R. Herring "Some Notes Contrasting Gas Practice during "the Past Twenty Years" were rewarded by hearing a lecture which contained very little regarding the past two decades, but which showed that we are standing at a place in the history of the gas industry where the practices that obtained as recently as August, 1914, have been proved by war-forced circumstances to have been capable of large revision, with economic result. In other words, while the war has hit the gas industry with uncommon severity, to say nothing of its share in the ordinary appalling penalties of the war, it has advanced the economic position of the industry at a pace that otherwise, judging from precedent, would have taken many years to accomplish; and this by establishing, through everyday practice and experience, facts that would not have been accepted a short while since as the products alone of the laboratory. The conditions arising out of the war, says Mr. Herring, have given us opportunities of investigating matters that could not, under normal conditions, ever have been attempted; and much useful information has now been gleaned, based on an extended period of practice, which formerly had been based upon experimental research and the judgment of experimenters. And further, we have him remarking that during the war, from the conditions that have prevailed, abundant evidence has been accumulated which shows that, where gas of 500 B.Th.U. has been supplied, containing only the unavoidable amount of inert constituents, public demands have been reasonably met for all purposes for which gas is now used. High-grade gas imposes limitations on manufacture and use which are not economical; and to this view for some years, through his widely diverse experience, first South and then North, Mr. Herring has remained steadfast. Illuminating power has been dethroned as a standard, and calorific value has been installed in its place. This is the position to-day; and from what we now know, and what was not known precisely before through (owing largely to the obstruction of Parliament) the lack of opportunity for putting the matter to practical test, the question awaiting determination is, What is the best quality of gas to supply for general use?

We are dead-against restrictions with business carried on in a legitimate, and not in an unprincipled, way. But it has with reluctance to be confessed that in some areas it has been found that the gas supplied has not been of a character favourable to the best results, and therefore to economy, for the consumers. Parliament confers gas powers on the understanding that, in their exercise, the convenience and interests of the district shall be considered, and not jeopardized by the supply of something that is not, subject to economical production, best suited for the purpose. The case for the defence of consumers has been proved by those who have been unfaithful to their obligations; and there appears to be fair certainty that avoidable adulteration of gas with inert constituents will in the not distant future have some prominence, whether or not the industry generally likes it. And apart from this, there is equal, if not more, certainty that there will be adherence to a calorific standard. One of the points that Mr. Herring discusses is the numerical value of this standard; and he comes to the conclusion that 500 B.Th.U. is quite a reasonable one for gas of good percentage combustibles. It was more by accident than by scientific and commercial reasoning that 500 B.Th.U. was fixed upon by the parliamentary authorities. It was a round figure that appeared to them—this before the war—to meet most local and manufacturing conditions, though here is an excellent case, for the imposition of a lower one in some districts where the nearest available, and therefore the most economical, coal is not equal to such a high standard. But under the new conditions established during the war, is the round figure the last word on the subject? Opinions differ. The question has to be settled on the basis of economy; and it can only be determined after a searching investigation. This, we confidently hope, will be given to it by the Board of Fuel Research, as well as by the Gas Components Committee of the Institution of Gas Engineers and the Leeds University—the Board and Committee working separately. To speak assertively in the light of present experience is not prudent; for the last thing the industry requires is to have, to the disadvantage of itself and of its customers, any permanent obstacle placed in the road of its economic development.

At present we are faced with the fact that there are men well qualified to express an opinion who consider with Mr. Herring that 500 B.Th.U. is a fair standard for universal adoption; a few stragglers are found with views tending to a numerically higher standard. The latter have small consideration for progress in manufacturing economy. On the other hand, there are men who favour a lower standard than 500 B.Th.U. Against these, Mr. Herring stands in opposition. But the grounds on which he does so (though not asserting that he is scientifically or economically wrong) are not firm. He knows of gas that, during the war, has been supplied as low as 450 B.Th.U., with very unsatisfactory results for the consumers. But this gas, he admits, was heavily charged with incombustibles. Such gas cannot be accepted as evidence against a 450 B.Th.U. gas of good percentage combustible character. Then again Mr. Herring says that, if we lower the calorific power overmuch (which is indefinite), then the distributory system—our mains, fittings, and other appliances—must be capable of passing more gas in proportion. So far as the distribution system is concerned, where this is in good condition, higher pressures will afford compensation; and as to our gas-using appliances, particularly where means of adjustment are available, the war has shown them to possess a good range in dealing with gas differing considerably in character from that to which they were formerly accustomed. And both mains and appliances that could deal—the latter indifferently perhaps—with 450 B.Th.U. gas containing (say) 30 p.ct. up to as much as the 40 p.ct. mentioned in the lecture of non-combustible gas could better deal with a 450 B.Th.U. gas containing (say) 90 p.ct. of combustibles. Apparently

Mr. Herring also looks for some *post*-war assistance from oil in maintaining the standard of 500 B.Th.U., where needed owing to gas washing or any other circumstance; for he makes a point of remarking that he believes the first article of commerce that will slump on the conclusion of peace will be oil. Our doubts of a "slump," though there will certainly be a price reduction, are founded on the fact that the world's output of petroleum and its products is not keeping pace with the rate of the growth of the demand. Anyway, whatever happens, there is no room for confidence as to any permanence of low prices for oil. To bolster-up confidence in this direction, there is not even any assurance as to material benefit accruing from the survey that is to be made in this country to ascertain the likelihood of securing supplies from home subterranean sources.

However, the numerical point at which the calorific standard is fixed is not the boundary of possible economies. Mr. Herring is an advocate of the use as a diluent of a well-made blue water gas of 300 B.Th.U.; and in his experience up to 33 p.ct. can be added (in the foul main) to a normally produced gas from ordinary coal, and the bulk, with a combustible content of 90 to 93 p.ct., would have a calorific value of 500 B.Th.U. There is well-known practical experience of the addition of 25 p.ct. of blue water gas giving the results mentioned, even after washing for benzol extraction. It is through blue water gas or steaming that the way is seen to raising the economic conditions of gas manufacture and supply. Economy is not summed-up by the admixture of a lower cost gas with one that costs more, so increasing the volume per ton of coal carbonized. There are the attendant or collateral advantages—less purchase and storage of coal, the use of coke produced on the works, and thus the lessening of the amount of coke for sale and an enhancement of value, together with reduced wear and tear on the carbonizing plant, all, of course, in proportion to make. Every economy gained in gas production, providing the gas is of serviceable quality—gas which can be readily brought into a state ensuring complete combustion, and giving a good flame temperature—is advantageous to the consumer.

This question of gas composition and of calorific value is the one of chief importance in the lecture. There are other matters of considerable interest; but they are too many for notice here. In conclusion, one more point, and this an old bone of contention, as to whether candle-power is any safe indication as to calorific value. Mr. Herring clings to it; we regard it as hazardous, except, perhaps, as a rough-and-ready means of valuation, if (there is much virtue in an "if") one knows that the conditions of manufacture are exactly consonant with those which have provided the figures adopted as standards. There must always be some guarantee that the conditions of make, and the composition of the gas in respect of inert materials, are up to those providing the standard figures, and that the gas is in the original state as it is produced from the coal. What reliance, too, can there be in a method which may approximately indicate by candle-power what is the calorific power, while the calorific power is absolutely no index whatever to the candle-power?

The Gas Industry and Undersea and Aerial Transport.

The members of the Society of British Gas Industries had a peculiarly interesting meeting on Thursday last, under the presidency of Mr. P. F. Holmes. It was made so by a paper that Mr. Samuel Cutler, jun., read, bearing the title "To the Continent by Channel Tunnel and Airship." For a society of specialist manufacturers whose commerce extends beyond our shores, there is seen great potentiality for trade expansion through the existence of the Channel Tunnel; and for the gas industry, the development of the airship should open up a fresh line of business in the provision of the necessary hydrogen gas.

The gas industry seems to be getting a finger into every pie; and this is a fresh one to which the industry has not yet given much thought, and yet it is a matter distinctly for it. Professional gas men are taking great interest at the present time in helping a country short of petrol to run their motor-driven vehicles, which would otherwise be laid aside. The users are finding such economy in gas that they are anxious for the development of portable storage, and permanence is foreshadowed in the desire. Now we are bidden to keep an eye on airship development; and to look into the question of hydrogen gas production, so as to know exactly where we are when the demand eventually arises. No one dares to smile at the warning for preparation. The span of the war has brought about developments of aerial transport—the goods imported to this country have not always been of a desirable character—that portend considerable headway in adoption for other than military purposes at the termination of the war. It may not be long before some commercial houses may be transporting goods by airship by the short cuts that the trackless ways above offer—not only to places in this country, but to the cities and towns of the Continent. It may even be that our most progressive gas-stove makers after the war will be advertising for commercial travellers to call, by biplane or triplane, at gas offices throughout the country, and to slip over to the Continent to interview possible customers there. The object-lessons of the war give sanction to the imagination to vastly extend its boundaries in respect of transport.

The same with the question of the Channel Tunnel. The exploits of the submarine have largely altered views in this regard. Our manufacturers, too, want to be put in the same position as Continental manufacturers in having at their disposal all-overland routes, to bring this country, the Continent, and even the Far East into more negotiable connection. Thoughtful ones also see in the Channel Tunnel the missing link to a larger world trading power, to the stronger leaguing of civilized nations in advancing the interests of the world by more frequent and extended intercourse, and maintaining peace among nations. We are not quite sure that all these good results will be achieved any faster by constructing the Channel Tunnel. No tunnel was needed to enable the several European nations to have unfettered intercourse; but an international upheaval has developed which, could the present position of it have been foreseen a few years ago—instead of arriving as it has done by the process of gradual evolution over three years or rather more—would have struck terror into the very souls of every nation involved. However, we do see that the Channel Tunnel would give to the country grand opportunities for trade expansion—in gas appliances and secondary gas-works products as in numerous other things; but our manufacturers must not forget that the facilities for export mean also facilities for import, and thus an accelerated competition. The Channel Tunnel and aircraft are factors in the future of this country's manufacturing and commercial expansion; and Mr. Cutler urges their consideration betimes.

Industrial Gas Demand, Measurement, and Constitution.

When visiting in their nascent days the furnace test-rooms that had been set up by the Birmingham Corporation Gas Department, one little dreamed of the powerful influence the work then inaugurated was going to have on the industrial development of gas in the capital city of the Midlands, nor what marked influence it would have upon the munitions production for a European war of a magnitude then beyond human conception. The furnaces, the high-pressure gas equipment, and the investigations then in hand at the test-rooms now seem simple and insignificant as contrasted with the actual work that is proceeding in Birmingham to-day through numerous furnaces ranging from mammoth to very small size. But to the pioneer work much credit is due. The small beginning has blossomed out into an industrial research department, in which important work is carried on that has been, and will be, of great assistance to the industries of Birmingham in perfecting the applications of gas to an immense variety of operations and circumstances. In Birmingham, perhaps more than in any other large industrial centre, the demand for gas during the war years has put an unparalleled strain upon the resources of the gas-producing plant; but the Gas Department has not allowed this strain to attain a mastery over them. Meeting it is one of their several parts in carrying on the war work of the country; and all that they have asked is that during the winter months domestic consumers and shopkeepers should keep their consumption of gas down to the minimum, so that there may not be a single furnace put out of action through shortage of gas supply. What has been done in Birmingham—the same as elsewhere—illustrates the enormous developments awaiting gas in industrial centres. What the industrial utilization of gas means to the Gas Department to-day is shown in the Presidential Address delivered by Mr. R. G. Marsh to the Midland Junior

Gas Association last Thursday. To gas engineers not only throughout the industrial areas at home, but throughout the world, the figures will be stimulating, and will enable their minds to look upon future possibilities with clearer vision. It is probably, as Mr. Marsh says, a unique experience that has been gained by the Birmingham Gas Department, in having exactly doubled its summer output of gas in the short space of six years; and the growth so far indicates no sign of abatement. The highest weekly output last year was 309 million c.ft., compared with 267 million c.ft. in 1913—figures of which many gas-works are proud to boast as the output of a whole twelvemonth. Since April 1 this year, the consumption has increased on that of last year by 675 million c.ft., or 13½ p.ct. Words cannot add to the significance of figures of this kind.

The address contains many other features bearing upon the work of distribution and sales departments. In collaboration with Mr. C. M. Walter, B.Sc., it will be remembered [see "JOURNAL" for Feb. 20 last, p. 350], Mr. Marsh has been investigating new methods of measuring gas under varying conditions of temperature and pressure; and the two workers have designed types of meters for the purpose. It would have been interesting to have had in the address some account as to any further experiences with these types. Ingenious as they are, that they do not fully comply with the views of their designers and the requirements may be inferred from the fact that Mr. Marsh, speaking of the advantage of a meter with large capacity that takes up little room, remarks: "Though difficult of accomplishment, I hope we "shall yet see a meter, designed on entirely new lines, that "will act as a definite and accurate measure of volumes "under all conditions of temperature and pressure, and at "all rates of consumption up to its capacity." In this connection, too, he makes the suggestion—apart from the obvious necessity of high-pressure meters being fitted with correcting mechanism—that it would pay to fit correcting devices on all low-pressure meters above a certain size, to avoid loss in registration through variations from standard temperature and barometrical pressure conditions. He thinks such a device should not be difficult of accomplishment; and he hints, too, at the possibility of the application of the principle to other apparatus—such as calorimeters. We hope that Mr. Marsh's anticipations of success in this direction will be realized, though we cannot expect any materialization of what is in mind until there is some relief from the current vigorous demands upon the time of every member of the staff at Birmingham.

In regard to the constitution of town gas, Mr. Marsh sees, like many other thinkers, large possibilities of progress in economy; and he believes that, in the prospective decisions of the Board of Fuel Research (which will, of course, take time to arrive at), as well as in the results of the work of the Joint Committee of the Institution of Gas Engineers and of the Leeds University dealing with gas composition, there will be much that will vitally affect the future prosperity of the gas industry. Birmingham, with its great demand for gas for industrial purposes, and with producer-gas plants of modern type in competition which can give a cheap gas containing a low percentage of inert constituents, knows that, to retain the large-class business which affects so substantially the economic conditions of gas manufacture and trading, a considerable departure will have to be made in the future. This is an aspect of the prospective conditions and extension of public service of the gas industry that the Board of Fuel Research should keep well in the foreground in pursuing their investigation into the matter of gas composition.

Coke Prices and the Increased Cost of Coal.

The 2s. 6d. per ton added by the Coal Controller to the price of coal has suggested to a correspondent that gas undertakings should uniformly advance the price of coke by equal amount—that is, put the whole of the 2s. 6d. on to the coke. There is some reason, if not complete justification, in this, seeing that it will be impossible to advance the price of gas till the end of the current quarter, while the extra 2s. 6d. on coal is retrospective. Another reason is found in the variable practice of municipal gas committees in regard to charges for coke. Many instances are known where the price of coke is not at all commensurate with that of coal; and for this the consumers of gas have to suffer, as any loss in reducing the net cost of coal by not charging the market value of coke must find compensation in some other quarter. Therefore, our correspondent thinks, it is of the utmost importance that advantage should be taken of the 2s. 6d. advance under the Price of Coal (Limitation) Act to raise the price of coke to something approaching its intrinsic value as compared with coal. Demand, as well as heating value, justifies an equivalent price. A good many municipal committees, however, defend low coke prices in the name of the poor, while manufacturers take a great part of the coke produced. The poor, too, are collectively considerable users of gas; and the lowest possible price for gas is a matter of importance to them, especially in winter. Of course, where the price of coke is already in the neighbourhood of that of coal, there may be some hesitation in placing the whole of the 2s. 6d. on coke. But the whole 2s. 6d. on coal will be placed upon the consumer; so that the coke user would have nothing over which he could legitimately grumble.

Gas for Motor Driving.

It is rarely that one sees a new method grow with such rapidity as has the use of coal gas for motor driving. Already it is a subject for discussion among interested technicians. Mr. W. M. Barrett, of Manchester, showed us last week that there is in it the technical and commercial subject-matter for a paper of considerable dimensions; the technical needs to satisfy the commercial requirements are being considered by those concerned, with the view to uniform practice; Mr. Walter Long is appointing a Committee to promote the use of coal gas for traction in substitution for petrol; and, to show envious critics that this business has in war time been forced upon the gas industry, owners of motor vehicles on the large scale threaten that, if they cannot get the gas they want from gas undertakings, then they will be under the necessity of erecting private gas-works of their own. That is the position with which at least one large gas concern is faced. Gas undertakings will not willingly forego the business, seeing that it promises to be a very big thing; and the methods of application are taking shape in something better than the crude form that marked the initial stage of application, although owners of motor vehicles do not seem to care much how they carry the gas so long as they can get the vehicles to run. Improvements in storage appear to come almost daily; and many minds are at work to effect them. But the goal is the carrying of gas under pressure in containers—the compressed gas being supplied from garages or gas-works, or by the means suggested by Mr. R. G. Marsh, in his Presidential Address to the Midland Junior Gas Association last week. He thinks that each individual car could be fitted with a small compressor, driven by its own engine, to enable it to fill its storage cylinders from a low-pressure supply, or, in the case of a multi-cylinder engine, perhaps one cylinder could be temporarily adapted to act as a compressor, driven by the remaining cylinders. We are not so sure about naphthalene gaining much of a footing for motor driving. With it there may have been a certain measure of success in the hands of experimenters; but the many loopholes for temperature difficulties are not a recommendation. It may be that the further petrol restrictions coming into force on the 1st prox. will add to the pressure for active steps being taken to provide the necessary conveniences for meeting the demand for coal gas for motor purposes. A full discussion of the position is promised at the annual meeting of the British Commercial Gas Association on the 31st inst.; and much interest should be forthcoming on that occasion.

The Portable Gas Company.

The publication in last week's "JOURNAL" of an extract from a paper read before the British Association in 1861, in which the author referred to operations carried on by the Provincial Portable Gas Company 92 years ago on the site now covered by the Gaythorn Gas-Works of the Manchester Corporation, has brought to light another interesting document (this time from Mr. W. Doig Gibb), dated 1825, which deals with "Proposals for Establishing in Edinburgh a Company to be entitled the Edinburgh Portable Gas Company, in Conjunction with the London Provincial Portable Gas Company." Apart from its historical value, one cannot help remarking upon the difference between the language employed in it and that to be found in a modern prospectus. For instance, we learn that the subscribers to the Provincial Portable Gas Company "consist of some of the most respectable individuals in the Metropolis." Again, "the projectors of the Edinburgh Portable Gas Company renounce all intention to hurt the

present Edinburgh Oil Gas Company." The gentleman appointed to receive written applications for shares had, it is stated, "in his possession a portable lamp charged with oil gas, as sent down from London, which will be exhibited at the first general meeting of the proprietors, proposed to be held in the Waterloo Hotel as soon as three-fourths of the sum allotted to Edinburgh is subscribed for." The proposals, of course, were in connection with the use of compressed oil gas; and so confident were the promoters of the safety of the system, that they declared that "no explosive mixture could be formed, if the contents of the largest reservoir were purposely allowed to escape into the smallest room; and from the lamps being subjected in the first instance to a pressure of 200 lbs. upon the square inch, beyond that which they will have to sustain when filled with gas, no possible danger can ever be justly apprehended." Any attempt that the citizens might have felt inclined to make to "get rich quickly" over the venture was frustrated by a provision that no person could hold more than twenty £10 shares. At the same time, "in order to enhance the value of the shares, and to prevent speculation, every subscriber must pledge himself not only not to transfer any of his shares for one year, but to retain at least five of his shares as his own *bonâ fide* property for three years after the formation of the Company."

Coal, Coke, and Patent Fuel Exports.

The Board of Trade returns for September complete the nine months' history of the exports of coal, coke, and patent fuel, the figures for which are now all lumped together into totals, and not separately presented as before. However, before dealing with the nine months, we may mention the figures for September, in order to maintain the completeness of the monthly statistics. The quantity of coal, coke, and patent fuel exported amounted to 3,337,534 tons, or a reduction of 759,103 tons upon September, 1915, and 361,032 tons upon September, 1916. The value of the quantity exported last month is £4,586,597—an increase of £887,437 on September, 1915, and a reduction of £278,435 on September, 1916. The average value of the exports last month was £1 7s. 6d. per ton, compared with £1 6s. 4d. a year ago. During the nine months, 29,438,835 tons have been exported, or a reduction of 5,620,702 tons upon the same period of 1915, and 2,004,037 tons upon that of 1916. The value of the nine months' exports is put at £39,485,355, or an accretion upon the corresponding period of 1915 of £10,331,496, and £1,474,368 upon that of 1916, which result is not a bad one for those concerned in the selling part of the business.

OBITUARY.

The Chairman of the Dartford Gas Company, Lieut.-Col. C. N. Kidd, V.D., J.P., whose death was recently announced, joined the Board of the Company in July, 1895, and was elected Chairman in February, 1908.

The death has occurred at Wellington, at the age of 75 years, of Mr. Harry Shepard, J.P., the Chairman of the Wellington Gas Company. He was a prominent and popular figure in the public life of the town, and was the oldest Freemason in Shropshire, having celebrated his jubilee in the craft a few months ago.

The Deal and Walmer Gas and Electricity Company have lost their Engineer and Manager, Mr. J. J. Kirkham, who died from heart trouble on Monday of last week, after having been confined to his room for nearly two months. He served his apprenticeship at Waterford, subsequently going to Carrick-on-Suir and New Ross. From the management of the gas-works at the last-named place, he came, about 21 years ago, to take the post of Manager of the Deal Gas-Works. Considerable developments have taken place in the works since, including the erection of a gasholder in 1903, and the extension of the mains to Kingsdown. Mr. Kirkham was much respected by the men at the works.

PERSONAL.

Mr. Chas. Donovan has taken charge of the Ballinasloe (co. Galway) Gas-Works in succession to Mr. Harrison.

Mr. A. Dow, the Manager of the Ardrossan Gas-Works, has been appointed Engineer and Manager to the Galashiels Gas-Works, in succession to the late Mr. Francis Scott.

We are glad to note, for the information of his many friends, that Mr. Wm. Coward, so long Managing Director of the firm of Wm. Coward & Co., Ltd., has returned from a prolonged absence in France, and has once more resumed his accustomed place at 100, Bishopsgate, E.C.

We are pleased to be able to record Mr. Thomas Potterton's attendance at the luncheon of the Society of British Gas Industries at the Trocadero last Thursday. Mr. Potterton has recently undergone an operation of a somewhat serious nature, but is happily now restored to health.

In recognition of valuable services rendered by him in the cause of the Allies, President Poincaré has conferred the Legion of Honour upon Dr. John Cadman, C.M.G., Professor of Mining at the University of Birmingham, and a member of the staff of the Ministry of Munitions. Dr. Cadman is Technical Adviser to the Government on questions affecting petroleum oils and petroleum products.

Sir Boverton Redwood, Bart., has been appointed by Mr. Walter Long Director of Technical Investigations in the recently-created Petroleum Executive, with a view to his dealing with technical questions of the highest importance, including the co-ordination of the work of petroleum production and that of petroleum research. In order to devote himself to his new duties, Sir Boverton Redwood will cease to act as Director of Petroleum Research.

An interesting item in the proceedings at the meeting last Tuesday of the General Committee of the British Commercial Gas Association was the presentation of a handsome piece of silver plate to Alderman W. Kay, of Manchester, on the occasion of his Silver Wedding. On the gift was engraved the following: "Presented to Alderman and Mrs. W. Kay, on the occasion of their Silver Wedding, by the President, Vice-Presidents, General Committee, and Officers of the B.C.G.A. October, 1917."

At a meeting of the Matlock Bath District Council, the Chairman stated that at the last meeting a request was put forward that a presentation should be made to Mr. W. Frost, the late Gas-Works Manager, who had removed to Annfield. A small Committee was appointed, and they had raised funds to purchase a silver cigarette case, which bore the following inscription: "W. Frost, from the Matlock Bath U.D.C., 1897—1917." As Mr. Frost was unable to attend the meeting, it was decided to write a letter to him, and send the present with it.

Mr. Robert Tindall, who has just completed his 25th year of service as a Director of the Imperial Continental Gas Association, has had sent to him (as to every officer and workman who completes 25 years with the Association) a silver medal for long service. Mr. Tindall, who resides at Ashburn, Fordingbridge, is also a Director of Tangyes Ltd.; and his engineering and other scientific knowledge has proved very helpful to the Association. In a way, his connection with the Association dates back even longer than a quarter-of-a-century; his father-in-law, Mr. Francis Bassett, of Leighton Buzzard, having been a Director before him.

Mr. Harry L. Strange, for many years Manager of the Honolulu Gas-Works, who came over to this side and joined the Royal Engineers as a Lieutenant two years ago, has since been promoted to the rank of Captain. In April last he was awarded the Military Cross; and in May was blown up and buried by a big shell. Writing subsequently to a friend in America, from a hospital in France, he said he was in bed "with slight concussion, and a devil of a shaking-up." Those of our readers who made personal acquaintance with Captain Strange on the occasion of the Gas Institution meeting last year, will congratulate him on the fact that his injuries did not prove more serious.

We learn that Mr. Thomas Glover has been fortunate enough (Mr. F. W. Goodenough having made it easy for this to be done) to secure the part-time services of Mr. W. M. Mason, the Secretary of the British Commercial Gas Association, to help him at the Coal Control Office. Mr. Mason will be able to attend to correspondence and inquiries when Mr. Glover is visiting works in the country or attending to his Company's business in Norwich. Mr. Samuel Glover, the Acting-President of the Institution of Gas Engineers, has recently done some valuable work for the Controller and for the gas industry in Scotland, where the difficulties incident on re-distribution need more than ordinary care to effect a settlement which will be satisfactory to the Controller in reducing transport, by distributing available coal to the greatest advantage, and which will, at the same time, avoid causing unreasonable inconvenience to the gas-works in certain areas. A number of other well-known gas engineers have also consented to act as Inspecting Engineers, to investigate difficulties arising out of coal supplies drawn from areas and pits not hitherto used.

Messrs. R. & J. Dempster, Ltd.

In consequence of the amount of work that is being carried out by them for the Admiralty and other Government Departments, Messrs. R. & J. Dempster, Ltd., have found it necessary to increase their London Office staff; and as the old accommodation in Gresham House, E.C., was too limited for the purpose, they have taken a suite of offices at Connaught Mansions, Victoria Street, S.W. The intention is that after the war these offices shall be retained, in order to meet the ordinary business requirements; and a technical staff will be installed, so that prompt attention may be given to inquiries relating to London and the South. The numerous extensions that have been carried out at the works will enable the firm to cope expeditiously with the large access of work that may be confidently anticipated as soon as the Declaration of Peace leaves the gas industry free to return to business on normal lines. The alterations have been carried out under the superintendence of Mr. J. Winson Scott. Mr. Norman Dobson, late of the Manchester staff, has charge of the London Department.

GAS ACTS FOR 1917.

THERE are before us the eight Acts referring more or less to gas supply passed by Parliament this year; and the provisions are here reviewed for the purpose of pointing out the changes made since the Bills were under notice in the issues of the "JOURNAL" for Jan. 2 and 9 last.

The Blackpool Corporation have secured the extension they sought of the borough boundaries, so as to include Bispham-with-Norbreck, and part of the township of Carleton. The powers of the Corporation in respect of gas are extended to the new boundaries, and the electricity powers of the Bispham Council are transferred and vested in the Corporation. [*Parliamentary Agents: Messrs. Sharpe, Pritchard, & Co.*]

The Gas Light and Coke Company are to be congratulated upon having obtained their Act without change from the original Bill. To review the Royal assented measure would simply mean reproducing the information we gave as to the Bill on Jan. 2 last. It may, however, be mentioned that the subjects dealt with are: The provision of ships, and the application to this purpose of the money powers of the Company; authorization to hold annual meetings instead of half-yearly ones; the payment by the Directors of interim dividends without the sanction of a general meeting; the use of the reserve fund; and the appointment of a Managing-Director. There are also provisions relating to nominations by employees in regard to transfers of stock, and as to the registration and transfer of stock in the names of employees in certain cases. [*Parliamentary Agents: Messrs. Dyson & Co.*]

The Haslemere and District Gas Act shows some alterations in detail from the original Bill. The capital proposed has been reduced from £41,435 to £38,435, divided into £23,435 of ordinary stock (called the original capital), and £15,000 additional capital. The division of the original capital into classes "A" and "B" and its distribution among the existing holders are as contemplated in the Bill. No alteration has been made in the clauses referring to the issue of redeemable preference shares or stock or of debenture stock. As to the borrowing powers, the Company are limited to a sum (including the £6200 previously borrowed) not exceeding one-third part of the amount of the capital raised. The suggestion in the Bill was one-half. The dividends, provision as to annual meetings, compulsory purchase of lands, and construction of works (together with the objectionable one-third restriction of secondary products purchases), and the repeal of the powers of the Godalming Gas Company in the parish of Witley are all in the Act as sketched when noticing the Bill. But we see that the maximum price has been reduced from 5s. 2d. to 5s. per 1000 c.ft., with power to the Board of Trade, at the expiration of three years, to impose a standard price with sliding-scale. Accompanying the testing-place clause is one which provides that "for the purposes of the appointment of a gas examiner under the provisions of section 30 of the Gas-Works Clauses Act, 1871, an application to two Justices by the London and South-Western Railway Company shall be deemed to have been made, and to have the like effect for all purposes, as though such application had been made by not less than five consumers of the gas of the undertakers." The standard of calorific power is to be 500 B.Th.U., as tested under the prescriptions of the Metropolitan Gas Referees. The pressure provisions are curious. They provide for 15-10ths pressure, except in the parts of the parishes of Witley and Bramshott now included within the limits of supply, where the pressure is to be not less than 10-10ths, "provided that all gas supplied by the Company to the London and South-Western Railway Company shall be supplied at such pressure as to balance a column of water not less than 20-10ths of 1 in. in height at the inlet of the primary meter or meters registering the supply to such Company." A succeeding clause provides, if the Board of Trade think fit, for the revision of the standard of calorific power or pressure, if within one month after the expiration of five years from the passing of the Act, or after any subsequent period of five years, the Company or any local authority or person who may appear to the Board to have a substantial interest in the matter, apply to them for a reduction or increase of standard. If required by consumers at any time within two years, the Company are to fix free of charge flat-flame burners suitable for the gas of the calorific power prescribed, in substitution of any burners (not being incandescent ones) in use before the passing of the present Act. There are clauses for the protection of the London and South-Western Railway, the Haslemere District Council, certain Rural District Councils, and the County Councils of Surrey, Southampton, and West Sussex. In the County Council provisions is one providing that, "if the County Council shall give written notice to the Company of such their desire before the Company commence to lay down any main or pipe, . . . the Company shall, under the supervision, and to the reasonable satisfaction, of the County Council fill-in any trench or excavation made by them in connection with such work to the height of 8 in. above the top of such main or pipe, and the County Council shall fill-in the remainder of the trench or excavation, and shall reinstate and make good the surface of the portion of the roadway broken up by the Company"—the Company, of course, bearing the expense. When this happens, the County Council are to indemnify the Company against all claims and liabilities arising out of or in course of such filling-in, reinstatement, and making good by the County Council, or any act or default of the Council in relation thereto. A one-sided clause relating to the use of a steam-roller provides that the County Council shall not be liable for any damage done to any distribution work of the Company by reason of it being laid at a depth below the surface of any main road insufficient for its protection from injury arising from the use of any steam or other roller. Reverting to the supply to Bramshott, if the Company are not furnishing, or are not prepared on demand to furnish, a sufficient supply of gas, the local authority or any body or person may apply for an Act or Provisional Order for the purpose of affording such supply. [*Parliamentary Agents: Messrs. R. W. Cooper and Sons.*]

Again in the case of the Hemel Hempsted District Gas Company's Act, the alterations that have been made during the journey of the measure through Parliament are all more or less in the nature of details. The land and works clause has now the one-third residuals purchasing restriction added. Power is given to construct a footbridge, the limits of supply are extended so as to include a portion of the parish of Redbourn, and within that part any gas mains or apparatus that may exist may be purchased; but a provision appears prohibiting the Company from supplying gas within any portion of the "parish of Redbourn which is now supplied with gas from the gas business belonging to, or reputed to belong to, Henry King Hiller and Clifford Holmes Hunt, save with the consent of the proprietors for the time being of that business." In the Bill deposited, purchase powers were sought; but now the above prohibition is included. The calorific power clauses have not been changed—the standard is to be 500 B.Th.U. on the usual terms; but the Company and the Corporation may agree as to the calorimeter to be used. Otherwise the apparatus and conditions are to be those applying in the Metropolis. The pressure of the gas is to be 15-10ths; but the London and North-Western Railway Company and the Midland Company have clauses (similar to the one mentioned in the Haslemere Act), providing that all gas supplied to their stations shall be at 20-10ths pressure at the inlet of the primary meter or meters. For two years flat-flame burners suitable for the gas to be supplied are to be fixed where required in substitution of those (not being of incandescent type) now existing. Included is the five years power to the Board of Trade to vary the calorific power standard, but nothing is said about the pressure. The additional capital required by the Company has been reduced from £30,000 to £24,000; and it is to be raised by the creation of ordinary "C" stock or preference stock. In respect of any preference stock hereafter created, it was suggested in the Bill that "the dividend should be of such rate as the Directors may determine at the time or times of the creation thereof." But in the Act it is provided that the additional capital to be raised shall not receive a larger dividend than 7 p.ct. on the part issued as ordinary capital and 6 p.ct. on that issued as preference. The usual borrowing powers are allowed. It was proposed in the Bill that, in respect of redeemable preference and debenture stock, the provisions of the Statutory Companies (Redeemable Stock) Act, 1915, should extend and apply to the Company as if any preference or debenture stock which the Company are authorized to raise under the powers of the Act were such preference or debenture stock as is referred to in Section 1 of the 1915 Act. But in the Act the terms of issue are made to conform to those that have been prescribed for gas companies in recent sessions. The redeemable preference shares or stock or debenture stock are to be issued on such terms and conditions as may be specified in a resolution passed at a special meeting of the Company convened for the purpose. If it is so provided in the resolution, the Company may (*a*) call in and pay off the shares or stock, or any part thereof, at any time before the fixed date of redemption, and (*b*) redeem the shares or stock, or any part thereof, either by paying off the shares or stock, or by issuing to any shareholder or stockholder, subject to his consent, other shares or stock in substitution therefor, and may for the purpose of providing money for paying off the shares or stock, or of providing substituted shares or stock, create and issue new shares or stock, or reissue shares or stock originally created and issued under the section. The Company may not redeem out of revenue any debenture stock or preference shares or stock created under this section. Special purposes, benefit, and pension funds are provided for. The measure also includes the sliding-scale with a standard price of 4s. 2d. within so much of the borough as is within one-and-a-half miles of the Hemel Hempsted Parish Church. Next to the power to purchase in bulk is a provision authorizing the Company to contract for the supply of gas in a crude or partially purified state. Differential prices are allowed according to the purpose for which the gas is supplied, provided that the Company shall not under the powers of the section give any preferential price as between any consumers who shall take a supply of gas for the same purpose under like circumstances. Provisions as to the appointment of a managing-director, the holding of annual meetings, the payment of interim dividends, and profit-sharing are found among a large number of now ordinary clauses. In clauses protecting the Corporation is one providing for the laying of pipes with not less than 2 ft. 6 in. of cover; and another arranges that the charges for gas supplied to the public lamps shall not exceed 20 p.ct. less than the price per 1000 c.ft. from time to time charged to ordinary private consumers residing within 1½ miles of the Parish Church. The Hertfordshire County Council, the London and North-Western Railway Company, and the Midland Railway Company have clauses giving them protection; but we do not see the one referring to power to apply for

an Electric Lighting Order—provision for which was included in the Bill as deposited. [*Parliamentary Agents: Messrs. Sherwood & Co.*]

There is not much change between the Bill and the Act of the Kenilworth Gas Company [see "JOURNAL," Jan. 9]. The first alteration noticed is that the additional capital has been reduced from £30,000 to £25,000. Otherwise the capital provisions stand as the Bill was deposited. The issue of redeemable preference shares or stock or debenture stock is arranged on the same terms as those alluded to in the Hemel Hempsted Act. The dividend powers, including the payment of interim dividends without the sanction of a general meeting, remain; as does the one-third rate of borrowing powers. No other change is detected until we come to the inclusion in the construction and maintenance of gas-works clause of the one-third residuals purchasing restriction, which was absent from the Bill. The next alteration is found in the introduction of a clause providing that if, after the expiration of fifteen years from the passing of the Act, the Company have not laid down mains for the supply of gas, and shall not be in a position to supply gas in Balsall and Berkswell, or in the portion of the parish of Stoneleigh that is included within the limits of supply, the additional capital shall be reduced by £7500 in respect of the parishes of Balsall and Berkswell, and £1500 in respect of the portion of the parish of Stoneleigh. The price of gas in the district of Kenilworth and within a radius of two miles from the scheduled gas-works lands, it was formerly proposed should be 4s. 9d. But this has been reduced to 4s. 6d.; while beyond the urban district and radius mentioned it is not to exceed the price charged within by more than 1s. Differential prices are allowed on the usual lines. The stand-by and calorific power clauses have undergone no change. But the proposal as to a minimum pressure of 1 inch has been altered to 15-10ths; and the London and North-Western Railway Company are to be supplied at a pressure of 20-10ths at the inlet of the primary meter or meters. There are a number of other clauses of usual character, including provisions affecting the co-partnership rules and benefit funds. The District Council have also secured a purchase clause to operate in the next session of Parliament. [*Parliamentary Agents: Messrs. Lees and Co.*]

When noticing the Bill of the Lea Bridge Gas Company, information was given as to their capital position; and it need not be repeated. The Act shows that they have secured the powers relating to the purchase of additional land for works purposes; but the appended residual products clauses contain the one-third purchasing restriction, which was not in the Bill. The £200,000 additional capital is allowed. It may be remembered that in the Bill the Directors asked for liberty to themselves determine the amount of dividend that should be paid in future on preference stock; but the limitation of 6 p.ct. has been imposed. The usual borrowing powers are allowed; but the provisions of the Statutory Companies (Redeemable Stock) Act, 1915, are to extend and apply to the Company as if any preference or debenture stock which the Company are authorized to raise under the powers of the Act were such preference or debenture stock as is referred to in Section 1 of the Act of 1915. Many clauses of usual character are embraced in the Act. Among them, the Company obtain power to effect agreements for the purchase of gas in a crude or partially purified state. For the rest there are no changes to record. [*Parliamentary Agents: Messrs. Sherwood & Co.*].

The word "United" has been eliminated from the title of the Sheffield Gas Company; and in future by this shortened name the Company will be known. When noticing the Company's Bill on Jan. 9, we gave the history of the Company in relation to capital, and pointed out how they were unable to issue additional debenture stock under their existing powers owing to the limitation of the dividend to 4 p.ct. Information was also given as to the capital conversion scheme; and it still holds good. The additional capital powers amounting to £600,000 have been granted. The borrowing powers and those referring to the issue of redeemable preference stock and shares or debenture stock are as described in the notice of the Bill. The sinking fund clause then proposed has disappeared. On the other hand, there is a new clause providing that if, within three years, the Company shall have failed to obtain statutory authority for the erection of gas-works on lands other than those on which the Company are by the existing Acts and this Act authorized to manufacture gas, the additional capital (including loan capital) for which authority is now given shall be reduced to the sum of £285,000, inclusive of the sum of £105,000 remaining to be issued under the Order of 1893, as amended by this Act. The Company have a sliding-scale of price and dividend all their own; and its nature is stated in the reference to the dividends on p. 62 of the "JOURNAL" for Jan. 9 last. The clauses referring to the extension of the limits of supply and the construction of new gas-works (including the one-third residuals purchasing provision) are as in the Bill. The coke-oven gas clauses contain the stupid provision imposed by a House of Commons Committee as to coke-oven gas not being supplied for illumination, which largely diminishes the value of the power. In connection with the coke-oven gas section, the Yorkshire Electric Power Company have a clause which ensures that there shall be no interference with any of their works. The Corporation, County Councils, and Railway Companies obtain protective powers. In those secured by the Corporation is one which provides that all mains and pipes to be laid by the Company in any street for the time being maintainable by the Corporation shall be laid in such a position under the footpath wherever reasonably possible, and otherwise at the side of the road, as the Corporation in writing under the hand of the City Surveyor may reasonably direct. This is also to apply in the case of any mains or pipes to be laid within 6 ft. of any sewer or water main or pipe of the Corporation in a street not maintainable by them if the road authority of such street consent thereto in writing. [*Parliamentary Agents: Messrs. Rees and Freres.*]

With the exception of one or two minor details, the Act of the South Staffordshire Mond Gas (Power and Heating) Company is precisely as the Bill originally reviewed. It will be remembered that the prices the Company were authorized to charge were not paying ones; and this Act empowers their increase. The Company have also secured the new capital authorization sought. The date at which the Board of Trade may make further revision of price is now after the month of January, 1920, and not 1922. Those readers who require further particulars will find them in our issue for Jan. 9 last. [*Parliamentary Agents: Messrs. Sherwood and Co.*]

COUNCIL MEETING OF THE INSTITUTION.

A MEETING of the Council of the Institution of Gas Engineers was held at the Offices last Tuesday; and, in the absence of the President (Lord Moulton) the chair was occupied by the Senior Vice-President (Mr. Samuel Glover).

The deaths of Alderman W. F. Cotton, of Dublin, and of Mr. Benjamin Green, of Mitcham, members of the Institution, were reported; and the sympathy of the Council with the bereaved was suitably expressed.

Resolutions were passed conveying the congratulations of the Institution to the President and Sir Dugald Clerk, an honorary member, on their appointment to the Most Excellent Order of the British Empire, and to Mr. H. E. Jones on his election as President of the Institution of Civil Engineers.

Acknowledgments of their election as honorary members of the Institution were read from Dr. F. Mollwo Perkin and Mr. D. Milne Watson.

Mr. Harry Dumbleton, the Manager of the Alliance and Dublin Consumers' Gas Company, and Mr. John N. Smith, the Engineer and Manager of the Stirling Gaslight Company, were approved as candidates for membership. Mr. Francis W. J. Belton, Assistant Engineer and Manager to the Corporation Gas Department, Macclesfield, and Mr. Frank L. Scaife, Works Assistant, Corporation Gas Department, Stockton-on-Tees, were approved for associate membership. Captain L. Cotes Preedy was transferred from the class of associate member to that of member.

It was decided to nominate Mr. T. Hardie, of Newcastle-on-Tyne, to serve on the National Gas Council Executive Committee as one of the Institution representatives during the temporary absence of Mr. Thomas Berridge owing to illness.

The resignation of Mr. W. R. Herring from the Life of Gas-Meters Research Committee was accepted with regret. In his place, Mr. A. A. Johnston was appointed.

It was reported that Mr. J. E. Kenshole, of Merthyr Tydfil, has been elected District Member of Council representing the Wales and Monmouthshire District Institution of Gas Engineers and Managers for 1918-19, and Mr. J. H. Brearley, of Longwood, to represent the Eastern Counties Gas Managers' Association.

Correspondence was reported which has passed between the Institution and the Department of Technology of the City and Guilds of London Institute as to arrangements being made, owing to the exigencies of the times, for candidates in "Gas-Fitting" next year who have served at least four years to the trade, to enter for the final examination without having passed in Grade II. It was agreed that this should be done.

Extracts from the Examiners' reports were presented on the examinations of 1917 in the subjects of "Gas Engineering," "Gas Supply," and "Gas-Fitting."*

A communication was considered with reference to a proposal to form a Bureau for the better co-ordination of engineering training. Mr. A. E. Broadberry was appointed to represent the Institution at a meeting to discuss the matter which is to be held at the Institution of Civil Engineers on Thursday, Oct. 25.

An application received from the Research Association for Refractories for financial assistance was reported, and was referred to the Joint Refractory Materials Committee of the Institution and the Society of British Gas Industries for consideration.

Questions were discussed arising out of the resolution passed at the annual meeting in regard to suggested alterations of the constitution of the Institution. It was felt that the present time was not opportune; and it was decided to postpone further consideration of the matter.

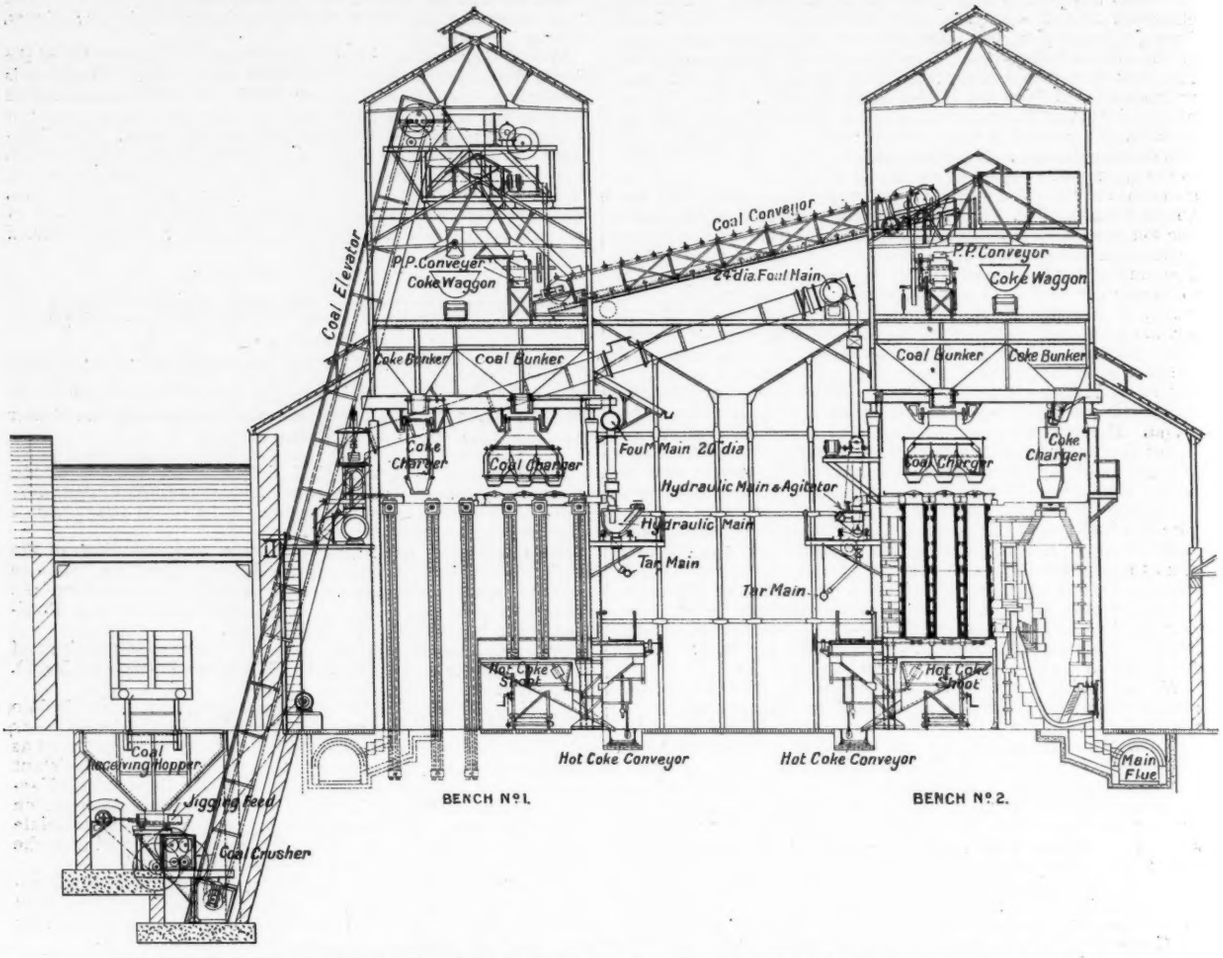
A statement from Prof. Cobb was presented, indicating the arrangements which had been made by the Gas Investigation Committee for carrying out the work entrusted to them, in regard to the examination of various grades of gas, with the object of ascertaining which is the most suitable both in production and use. The scheme of research, which is well in hand, was approved.

The report of the Finance Committee was presented, and the proceedings terminated.

* These extracts were given in last week's issue of the "JOURNAL," p. 131.—ED. "G. J."

INTERMITTENT VERTICAL RETORTS AT LEEDS.

Installation by Messrs. Goodall, Clayton, & Co., Ltd., at the Meadow Lane Works.



IN the paper he read at the last meeting of the North of England Gas Managers' Association [*ante*, p. 72], Mr. Harold H. Collett, of the Meadow Lane Gas-Works, Leeds, detailed some of his experiences with the two benches of intermittent vertical retorts put up at the works by Messrs. Goodall, Clayton, & Co., Ltd.; but he did not actually describe the installation. This we are now able to do, as well as to give two drawings, which have been forwarded by the firm named.

The installation consists of two benches, each containing five beds of retorts, having 18 retorts per bed, making 90 retorts per bench or 180 retorts in all. The installation is capable of producing over 2 million c.ft. of gas per diem. No. 1 Bench was put to work in December, 1913; and No. 2 Bench, in April, 1916. The two benches are the same in principle; but No. 2 Bench embodies the latest improvements. In the case of No. 2 Bench, the height of the setting is 22 ft. from ground level, and 20 ft. 10 in. from back to front; the centres of the division walls being 16 ft. 8⅜ in. The setting is built from the ground level on the producer side; the retorts themselves resting upon cast-iron baseplates, supported by heavy sections of rolled steel joists, carried on the front buckstays, about 9 ft. above floor level, to allow the coke to be discharged underneath.

There is a producer to each setting running the full height of the bench, and built centrally. The producer is of the stepped-grate pattern, having a feeding-door at the top and double furnace-doors at the bottom. The producer gas is taken off at the level of the floor of the retorts and enters the combustion chambers; the latter being situated at the bottom of, and between, the retorts, where it meets the pre-heated secondary air. The products of combustion travel upwards—circulating all round the retorts, leaving by waste-gas outlets at the top, descending the regenerators, and thence to the main flue, pre-heating the secondary air *en route*. The main flue extends the full length of the bench, and is connected to a chimney built of steel, fire-brick lined.

The bench is efficiently braced with heavy main buckstays, front and back, and intermediate bracing secured by tie-rods. The main longitudinal tie-rods running the full length of the bench are fitted with volute springs at each end, to take up the expansion of the bench. On the tops of the front and back buckstays, running longitudinally and crosswise, are heavy sections of rolled steel joists, carrying the coal and coke bunkers and the superstructure over same. The coal-charger and breeze-shoot to the retorts and the coke-shoot for the furnaces are also suspended from these rolled-steel joists. All bunkers, whether coal, coke or breeze, are designed to hold two days' supply of their respective commodities.

COAL AND COKE HANDLING PLANT.

The coal is raised by an elevator, which also serves No. 1 bench, and delivers into a shoot leading into a push-plate conveyor, which bridges the span between the two benches. This cross conveyor delivers into a push-plate conveyor running the full length of the bench, and on the centre line of the coal-bunker. Sliding doors are fitted into the bottom of the conveyor, so that the coal can be deposited in any part of the bunker. The coke for the furnaces and the breeze for the retorts are raised in tipping wagons to the bunker level by means of a hydraulic hoist. From the hoist, the wagons are run on rails; the contents being deposited in their respective bunkers.

This hoist also acts as a duplicate in the event of a temporary breakdown to the coal-handling plant. Up to the present, this measure has not been resorted to. The coke discharged from the retorts is led into a coke-conveyor by means of an inclined travelling shoot. The conveyor is on the level inside the retort-house, and inclined outside. The coke can either be led straight into a bunker or screened and deposited in a second bunker, to be removed by telpher plant. The coke is quenched automatically in the trough. The coal and coke handling plants, except the hoist, are electrically driven. The superstructure over the bunkers is a steel framework of girder stanchions horizontally braced with channels and girders. This framework is divided into suitable panels, which are filled in with 4½-in. brickwork. The structure is rigidly stayed to the buckstays and girder work of the bench. The roof is of slates laid on angle-iron purlins.

HYDRAULIC MAIN AND GAS TAKE-OFF PIPES.

The gas take-off pipes from the retorts to the hydraulic main are 8-in. diameter; one pipe taking the gas made from three

retorts. Each pipe is fitted with a cleaning door, having a screw fastening and hand-wheel. The hydraulic main is of special design; dip-pipes being dispensed with, and provision made for sealing and unsealing any one set of three retorts. An agitator is fitted in the main; and a tar-pipe runs the full length of the bench, having separate connections to each hydraulic main, with valves for flushing.

From the hydraulic main, the gas is led to the foul main through three pipes of ample area and length to allow condensation. A steam-pipe is provided for each retort, fitted with a valve, for the purpose of steaming.

Discharging Gear.

The discharging gear is very simple, and, except for ordinary lubrication, requires little or no attention. Its duties are to open and close the bottom retort-lids, and put on and release catches and eccentrics to them. The retorts, being sets of three in line, are discharged simultaneously. Three doors are keyed to one shaft. The doors are opened and closed by rack-and-pinion motion, driven by a hydraulic ram. By means of levers worked by hand, the catches and eccentrics are put on or released, whichever the case may be. There are two additional eccentric levers to each bed. It is interesting to note that this is the only moving part in connection with the working of these settings.

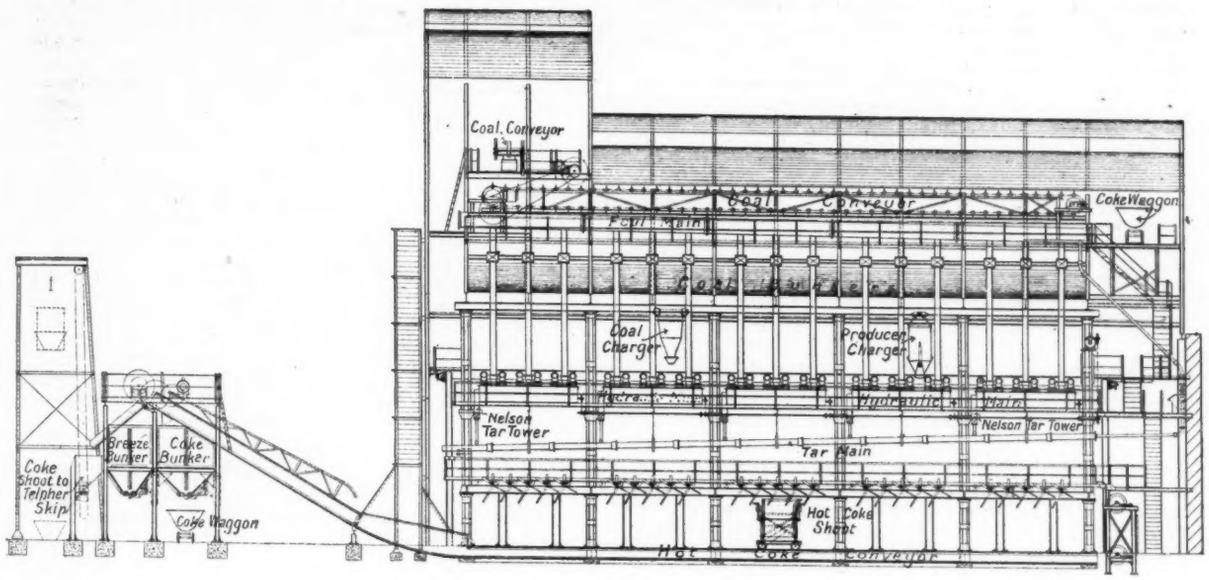
General.

Access to all parts of the plant is provided by means of staircases and gantries of convenient width, so that every part is within reach. The retort-house is roomy and well-lighted; and anything tending to improve the conditions of labour has not been lost sight of in the design. The floor of the retort-house is of blue bricks laid on edge, set in cement.

Standard Conditions of Control.

In his paper, Mr. Collett referred to standard conditions of our control having been reached; and this point was, it will be remembered, dealt with by Mr. Thomas Settle, of Leeds, in the discussion. To further confirm these facts, Mr. Settle has sent on the following records of air supplies, damper areas, and temperatures.

Tests were made at Birmingham, and also at Leeds, to permanently transfer a higher temperature to the top of the setting, in order to quicken the penetration of the charge, and at the same time reduce the temperature in the combustion chambers by a similar number of degrees. How readily this is accomplished by the method of taking-up the flame higher into the setting is set forth by the accompanying figures:



—	Birmingham, 15 Beds. Eighteens.	Leeds, 10 Beds. Eighteens.	Leigh, 4 Beds. Eighteen, Nine, and Six.	Morley 3 Beds. Eighteen, Nine, and Six.	Ossett. 4 Beds. Eighteens.	East Hull. 5 Beds. Eighteens.	Truro, 3 Beds. Eights and Fours.	Truro, 1 Bed of Fours.
	Average.	Average.	Average	Average.	Average.	Average.	Average.	Average.
Primary	46 sq. in.	54	58	54	55	32	28	14
Vacuum	2	1·5	1	1·5	1·5	2	1	1
	10	10	10	10	10	10	10	10
Secondary	40 sq. in	45	54	50	55	24	25	12·5
Vacuum	2	2	2	2	2	2	2	2
	10	10	10	10	10	10	10	10
Bench damper	80	98	108	108	98	72	59	28
Vacuum	4	4	4	4	4	4	4	4
	10	10	10	10	10	10	10	10
Waste flue	3	3	3	3	3	3	3	3
	10	10	10	10	10	10	10	10
Vacuum combustion chambers.	2	2	1·5	1·75	1·5	1·75	1	1
	10	10	10	10	10	10	10	10
Middle chambers	2	1·5	1	1	1	1	0·75	0·5
	10	10	10	10	10	10	10	10
Top of setting	1·5	1·75	1·5	0·75	0·75	0 5	0·5	0·5
	10	10	10	10	10	10	10	10
Temperature combustion chambers	1213° C.	1224° C.	1215° C.	1210° C.	1220° C.	1166° C.	1228° C.	1234° C.
Middle chambers	1112° C.	1130° C.	1112° C.	1115° C.	1118° C.	1050° C.	1136° C.	1180° C.
Top chamber	1045° C.	1016° C.	1020° C.	1023° C.	1026° C.	1005° C.	1118° C.	1144° C.
	A	B	C	D	E	F	G	H

A, B, C, D, E, G, H. Large section of retorts, 1912 pattern. F. Small section retorts, 1910 pattern.

With a wall temperature of 1100° C. average, the temperature of the core of the charge is approximately as follows:—

End of 1 hour	120° C.	End of 6 hours	370° C.
,, 2 ,,	150° ,,	,, 7 ,,	400° ,,
,, 3 ,,	220° ,,	,, 8 ,,	455° ,,
,, 4 ,,	300° ,,	,, 9 ,,	490° ,,
,, 5 ,,	345° ,,	,, 10 ,,	745° ,,

	Temperature Before Adjustment.	Temperature After Adjustment.	Increase.	Loss.
	° C.	° C.	° C.	° C.
BIRMINGHAM—				
Combustion chamber	1245	1212	—	31
Middle ,,	1130	1112	—	18
Top ,,	1016	1048	32	—
LEEDS—				
Combustion chamber	1251	1217	—	34
Middle ,,	1115	1107	—	8
Top ,,	1006	1040	34	—

ELECTRICITY SUPPLY MEMORANDA.

The Domestic Heating Season.

The autumn is speeding towards winter; and the season is here when, as a rule, we are invited to inspect new designs of gas-fires, and to see what improvements contributing to efficiency makers have been able during the summer to effect upon previous patterns. But this year, the invitations are missing, which means that limitations compel present adhesion to prior achievement. We know, however, that the makers have not been overtaken by lethargy; and that when there is again freedom in securing the raw material, when once more labour is available in full measure, and when works are freed from the exigent requirements of war, they will (as soon as order is restored) be showing that they have done their part in keeping an eye upon the future and the gas-supply industry's interests, which are their own. The makers of electric-fires are in the same position as the gas-fire makers in respect of materials, labour, and so forth, but, over-all, in a worse one in that the thermal value of the "fuel" furnished to their appliances is so low in relation to cost, which cannot be helped, as is obvious when regard is had to the calorific power of the fuel expended to generate electrically 3420 B.Th.U. However, we learn from the writer of "Cooking and Heating Notes" in the "Electrical Times" that electric-fires can no longer be obtained in the many forms to which the industry had become accustomed before the war. We occasionally see now electric-fires that are introduced as new types, but which are mostly merely enlargements of old types, through the introduction of extra elements, set perhaps in a new framework.

An Earthenware Bodied Electric-Fire.

But the trouble in procuring metal has led the General Electric Company into a search for substitutes; and they have adopted an earthenware body, which can be enamelled and glazed to harmonize with any surroundings. The casings are moulded in one piece; and they are reported to be mechanically stronger than "light" metal castings, and will withstand rougher usage. Artistically, they are said to be the equal of metal casings, are less subject to depreciation, and are more readily kept clean. The earthenware body, it is also stated, absorbs very little heat to be given off by convection, or, as our electrical friend of "Cooking and Heating Notes" puts it, "when switched-out very little stored heat remains to waste its sweetness on the desert air." The metaphor is not good. As desert air is usually rather hot, the amount of heat given off by the electric-fire would not make much difference. "Desert air" also suggests a shortage of humidity, which, in a room, is a condition promoted by too much convected heat—hence headaches and other discomforts; and the lesson learned by the gas industry, through experience of the old type of gas-fire, with its air baking and drying structural provision, and with the new type of gas-fire (which gives something like 50 p.ct. efficiency as radiant heat, and only about 25 p.ct. as convected heat), is that what is practically a reversal of the old conditions has made the difference between success and non-success. In this new earthenware bodied electric-fire, the elements are made curved from top to bottom of the opening in the casing; and it seems that the makers are largely depending upon the desiccation of the air to increase the heating efficiency of the fire, for we read: "In order to permit the free passage of the air under and through the panel elements, the heater is raised above the floor-level on short and substantial feet, and its base is open. Thus a current of air passes through the elements, and is discharged towards the top of the fire, which heats mainly by direct radiation and also convection." Perhaps some day the makers will learn that the passage of the air through the incandescent elements is not good practice.

Pipe Lines v. Pole Lines.

On more than one occasion, we have shown that an amount of scepticism prevails in the electricity industry as to whether transmission of electricity for long distances from super-generating stations (located, say, at the pithead) will show any economy over the conveyance of coal or gas from the pithead to local power stations. On theoretical calculations, considerable doubt exists; and our advice has been that the interested electricians should ascertain the lessons of actual practice, by getting into touch with those who have been working on gas and electrical transmission on the large scale in America. Our last reference to the matter was on Sept. 25 [p. 553], in connection with an article by "D.V.M." in the "Electrical Times"—a writer whose thoughtful arguments have before been brought to the notice of readers of the "Memoranda." Mr. George Helps has now contributed to our contemporary an article containing calculations on high-pressure gas transmission, which he thinks will be helpful to "D.V.M." The prelude to Mr. Helps's figures is in characteristic vein—almost, some will think, heretical vein. Of course, electrical engineers will realize that personal opinions may not represent the general view of the gas industry. Gas engineers, Mr. Helps tells the electricians, as a body have fought electricity for lighting quite long enough. But our electrical friends must read this statement with the context: "If they continue the fight to further extremes, they will find that the gas they have been selling for lighting purposes has been produced at a cost that leaves no reasonable proportion of profit on the revenue it brings. . . . The gas engineer's ability at the moment is to be measured largely by the fact that he is still supplying a costly gas suitable for flat-flame lighting." There are few gas engineers who are prepared to relinquish the fight for lighting; and with eyes turned generally to-day to a gas that is not so suitable for flat-flame burning, but will give greater economy for heating purposes, and a good flame temperature to boot, gas lighting by incandescent means will continue the superior economical light per unit of illumination afforded. Nor are there many gas engineers who will accept as true the Helps' dictum that their "ability" is to be measured largely by the fact that they are still supplying a costly gas suitable for flat-flame lighting; they will suggest that the pronouncement be watered-down a bit by the fact that their existing legislative requirements, and the reticence of directors and committeemen, are obstacles to a change of the character of the gas they supply. Mr. Helps also pats the electrical engineer on the back, and gives the gas engineer yet another kick. The electrical engineer "has not taken to a fitting or general hardware merchant's business to anything like the same extent as the gas engineer. Gas undertakings should be content to produce and sell energy in the form of cheap gas, and leave all outside trading in appliances to other private individuals or companies, and electrical undertakings will do well to follow the same line." Electrical engineers will smile. They have for years been trying to persuade Parliament that they ought to have powers to trade in electrical appliances. Gas engineers, too, will smile; for had they left to the fitting or general hardware merchant the development of business in gas-using appliances, the gas industry would not have attained the dimensions it now boasts, and the door would have been wide open for its competitors. And at the head of a trading business in gas-fittings, history records that the name of "Helps" has honorably stood. Circumstances may sway opinions. However, on the main subject, Mr. Helps considers the fact established that gas is the main source of power whether for generating electricity or other purposes; and how he arrives at this conclusion is shown by the extracts from his article on p. 184.

Future Electricity Supply Policy.

We do not know whether a statement that the Stretford District Council have had before them represents the policy which urban district councils generally desire to be ratified by the Board of Trade Electric Power Supply Committee. If so, the policy shows a mingling of good sense and a well-developed self-preservation. The statement proposes: (1) That the principle of distribution by local authorities should be retained. (2) That no charge should be made on the general body of ratepayers for the benefit of electricity consumers; and that the outstanding debt of any small superseded station should be taken over by the super-station authority. We hope the former means that it is desired that the vicious habit of taking profits in aid of the rates shall be forbidden. But, as to the second part of No. 2, the taking over by the super-station authority of outstanding debts of the kind (they have to find a home somewhere) will not contribute to the economy of the super-station. (3) That the super-station authority should be under obligation to supply energy in bulk. (4) That the super-station authority should be under obligation to supply energy to local authorities at uniform rates. This is rather vague without explanation. If it means uniform rates subject to the conditions of demand, well and good; but if it means uniform rates without consideration of demand conditions, then it may be at once taken that it will be unacceptable. (5) That large power consumers be supplied through the local authority, and not direct from the super-station authority. (6) Local authorities to have a preponderance of representatives on the super-station authority. This last condition would ensure the policy of the super-station authority squaring with the notions of municipal authorities, and leave the supply companies the constant victims of such notions.

Meter Supply Difficulties.

The trouble over the supply of meters is not confined to the gas industry. It is being felt equally acutely in the electricity industry; and electricity suppliers are considering means by which they can mitigate the trouble. The difficulty where flat-rates obtain, and the rateable value system is not in use, is greater than that of the gas industry, inasmuch as a meter is required for lighting, and one for other domestic uses—in view of the differing flat-rates for the two purposes. The Darlington Electricity Committee are seeking to overcome the difficulty by arranging that domestic consumers desiring to use electricity for heating, &c., shall be charged 4d. per unit up to the amount consumed for lighting in previous corresponding quarters, and 1½d. per unit for excess consumption—the amount to be paid by a consumer to be not less for any six months ending June or December than the amount fixed for lighting *plus* 20s. for heating or cooking. Thus the installation of two meters on a consumer's premises will be avoided. When the lighting restrictions are withdrawn, and there is less need for economy, the "corresponding" period will have to be shifted farther back, or consumers will be getting a proportion of their lighting units at heating rates.

On Jam Making.

It is a phenomenon of a very interesting character that heat electrically developed will (according to electrical belief and assertion) do anything in the kitchen much better, and with less

waste, than heat developed by any other means. There have been faddists and cranks we suppose practically ever since the world began, and there have always been those who have used their wits to trade on the unsophisticated. We have heard of the tremendous waste of meat that is supposed to take place with gas-ovens, but not with electric-ovens. No matter whether temperatures are uniform, no matter whether the temperature is higher in the electric-oven, it is all the same—the electric-oven simply declines to waste meat to the same extent as the gas-oven. Perhaps there are dolts who believe this sort of thing; but for the sake of a sane world we hope their number is small. It is jam now. We have had jam all our lives—delicious jam that has been made by heat other than that electrically derived. Jam has made the world's mouths water; and the call has been for more and more jam. The facts that this jam has not become syrupy, that its gelatinizing properties have not been destroyed in the boiling process, that though it is kept in store its nature is not altered, and that it is firm and pleasant in taste, show that the jam in its making has been exposed to a gentle uniform heat. But it seems, according to the gentleman who prepares "Cooking and Heating Notes" for the "Electrical Times," but who we are pretty confident is not a jam-making expert, that all these things ought not to be when governable gas is used, because of the uneven gas pressure and the influence of draughts which make steady boiling most difficult, and of the tendency of the users of gas to boil the jam more rapidly than is necessary or desirable, in order to get the preserve made more quickly. It is not explained how it is, if this tendency exists with gas, it does not with electricity, with its quarter, half, three-quarter, and whole heat. He does not explain how it is that jams made on the gas-ring, which can be adjusted to any heat required, has been found so good throughout the world. What does this good fellow mean, too, by "uneven gas pressure?" Will he give us some idea in figures as to what he is driving at, and the difference that the variation such as there actually may be makes to the flame temperature. Never until the advocates of electric cooking came along had we heard such a lot of humbug preached as now about gas operation, which shows the pressure that the factors of cost, time, and reliability have brought to bear on the development of this branch of the electrical business. We had almost forgotten the question of waste. According to the electrical informant, of the weight of the original ingredients of the jam from 87·5 p.ct. to 92·1 p.ct. is returned as jam; but the average using a gas-ring is only between 50 and 60 p.ct.—due to the before-mentioned uneven gas pressure, influence of draughts, and consequent unsteady boiling. It is safe to say that there have been thousands of tons of jam made this year in the homes of the United Kingdom by the aid of gas heat, and well made too. But the deduction we are expected to make from what our electrical friend says is that the greater part of this jam will suffer in the manner already described; but, like many housewives who have been making jam by the aid of gas-rings, we are not so silly.

GAS AT ECONOMY HALL.

These are days when we all talk of economy in the national interests, as well as in our personal ones; and there has been a great deal of lecturing and demonstration as to how in certain details, labour-saving can be effected in the home. The gas-fire, the gas-cooker, the gas water-heater, the gas-boiler, the gas-iron, and so on, have all come in for recommendation in this direction. And naturally so, seeing that the turning of a tap displaces coal purchase, storage, and carrying, the lighting of fires, the time spent in waiting for them to burn up, and then the constant attention, cleaning, and carrying of ashes, not to speak of the incidental smoke and dust. One of the missions of Economy Hall, where the British College of Cookery and Domestic Economy is housed, is to teach, through a staff of certified lady instructors, how to properly use gas-cookers, so as to derive from them not only economy, but uniform high-class results. If one does not know where Economy Hall is, then that one will have no difficulty in finding it when informed that it is located immediately opposite to the Polytechnic in Regent Street. The Manager is Mr. H. P. Jones, the Secretary Mr. W. North-Row, F.R.H.S., and the staff altogether numbers 35.

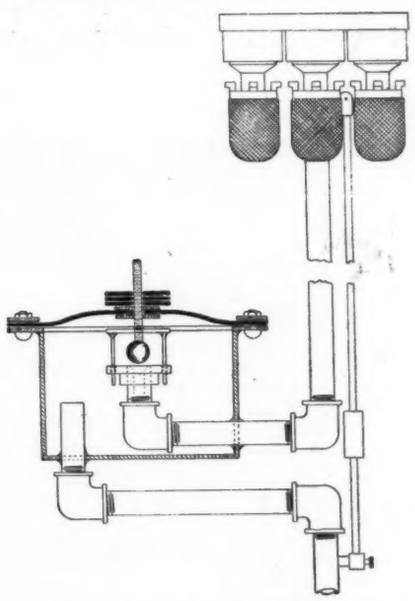
A visit is a matter of much interest; and the opportunity is there for doing a large amount of educational good. The unpretentious frontage is no index to the interior of the building. The instruction rooms—spacious and airy they are—are in the upper part of the building. Below is the restaurant, which comprises a couple of large daintily decorated dining-rooms, with the kitchen adjacent; and in the entrance-hall is a counter (adjoining the restaurant pay-desk) on which are displayed for sale the dainties that are made in the instruction rooms. In the large instruction room, there are six new pattern cookers of the Davis make. There were eight; but two have been removed in order to give space for larger sizes. A gas hot-plate is also part of the equipment. The gas-stoves are widely separated one from the other; so that the lady instructors can give individual attention to those who attend the college for instruction, without in any way interrupting the instructional work that is proceeding at the next stove. But we see that the College is not in existence for showing preference. There is an electric-cooker here; so that, if students desire it—the choice rests entirely with them—they can have lessons in electric cooking. In the next and smaller instruction-room, two gas-cookers are fixed, as well as an electric-cooker, which (as in the other case) looks as much like a gas-cooker as anything can do, excepting in the matter of the hot-plate, which is fitted with three heating elements. Imitation is the sincerest form of flattery, even in style. In the restaurant kitchen there are a large double-oven gas-cooker, a smaller gas-cooker by its side, and a large gas-heated table, for carving and keeping plates and food warm. The place has only been open about three months, and already it is averaging about 700 lunches a week and some 400 teas, which (as Mr. Jones says) is not bad for a start. The report of the lady instructors is that they find gas an uncommonly useful servant; and the results obtained by it are excellent. The pastries and other articles exposed for sale are, through the senses of sight and taste, proof of this.

[There was a short allusion to Economy Hall in "Electricity Supply Memoranda" for Aug. 28. This further reference is a sufficient answer to the points then made.]

GAS-LAMPS AND AIR-RAIDS.

Mr. H. E. Copp's Simple Controller for Extinguishing.

For the illustration given here of a simple apparatus for extinguishing public gas-lamps on the occasion of an air-raid, we are indebted to Mr. Harold E. Copp (the Engineer and Manager of the Etruria Works of the British Gas Light Company, Ltd.), who, in forwarding it, sends the following explanatory remarks.



I understand that an order has been recently issued by the Home Office that public lamps shall all be extinguished within five minutes of the receipt of the order to take the usual precautions in the event of an air-raid; so that, notwithstanding the agitation which is in progress in most towns for an extension of public lighting, it appears that, owing to the difficulty of arranging to extinguish the lamps in so short a time, the public will have to be content with even less street lighting than at present. The popular impression appears to be that although gas cannot be extinguished instantaneously, public electric lighting can be. This, of course, is quite an illusion, as public electric lamps are usually worked off ordinary circuits by means of automatic relays.

Gas-lamps may be controlled by means of pressure wave controllers. But for obvious reasons these cannot be regarded as entirely reliable; for if the pressure waves were not properly given and some controllers failed, hopeless confusion would result. It is a wise precaution, as well as the common practice, in most towns to reduce the gas pressure in the mains during the progress of an air-raid. It occurred to me that simple controllers could be constructed to extinguish public lamps with such diminution in pressure. I have therefore designed the simple apparatus illustrated, and have found it most reliable and satisfactory. It can easily be constructed by a skilled gas-fitter or meter-repairer; and it has proved itself so valuable that I venture to think that readers may be interested. The diaphragm is cut from a dry-meter leather. The other details of construction are so obvious as to need no further description.

The London County Council, in response to a request by the Board of Trade, have nominated Mr. J. Ollis, the Chief Officer of the Public Control Department, as their technical representative to attend a conference with the Director of Fuel Research with regard to the composition and quality of gas.

BRITISH COMMERCIAL GAS ASSOCIATION.

Report of the Executive Committee.

AT a Meeting of the General Committee of the British Commercial Gas Association last Tuesday, the Executive Committee presented a report from which the following extracts have been taken.

PRESIDENT FOR 1917-18.

The Executive have unanimously resolved that Sir Hallewell Rogers be invited to accept nomination as President for another year; so that, in the happy event of the war being terminated within that period, a National Conference might be held in Birmingham in connection with the annual general meeting of 1918.

NEW SUBSCRIBERS.

It is satisfactory to be able to report that the list of undertakings giving support to the Association continues to increase steadily. The following have been added since the last meeting of the General Committee: Brisbane, Hessle, Newark, North Middlesex, and Cairns.

FUEL RESEARCH BOARD.

A request from the Board of Trade asking for the appointment of a representative to meet the Fuel Research Board was received; and the Executive Chairman represented the Association at the conference subsequently held.

The several organizations connected with the gas industry which were represented at the conference have agreed to submit their views jointly through the National Gas Council; and a memorandum of questions specially important from the commercial standpoint has been prepared for the information of the Council, and is submitted for the consideration of the Committee.

COAL GAS FOR MOTOR TRANSPORT.

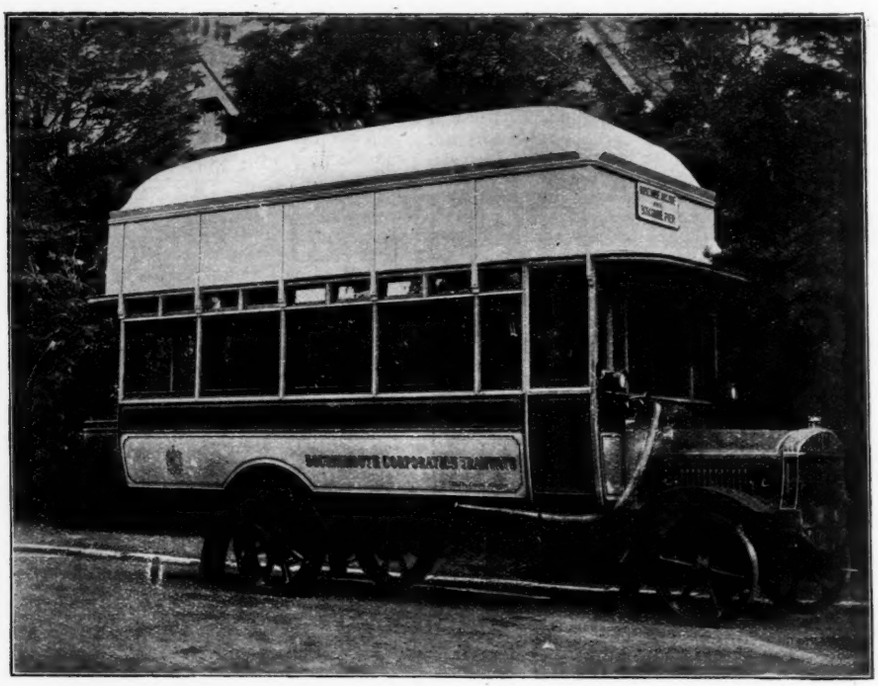
The special report which the Association prepared and issued to the public has been the means of arousing a remarkable amount of interest in connection with the question of the use of coal gas for motor vehicles. Practically all the papers devoted to, or in any way connected with, the motor industry have been publishing a large amount of editorial matter in connection with the subject; and many inquiries for information (in person and by letter) have been received at the Association's office from all quarters—including Government Departments.

The question has assumed so much importance that the Executive recommend that arrangements should be made to have a full discussion at the annual general meeting on the 31st of this month, and that Mr. E. S. Shrapnell-Smith (the Economy Officer to the Petroleum Executive just appointed by the Government), Mr. H. H. Gregory (the Technical Adviser to the Royal Automobile Club), and Mr. J. G. Clark (who carried out the tests on behalf of the Association), together with others who have taken a special interest in the question, should be specially invited to take part in the discussion.

A request has been received from the Commercial Motor Users' Association that the Association should obtain and furnish to them a list of all points throughout the country at which gas can be obtained by motor drivers, and on what terms.

AN OMNIBUS FITTED WITH A "BOURNEMOUTH" CONTAINER.

Meeting New Demands.



AMONG undertakings which are taking active steps to meet the rapidly growing demand for gas for the purpose of driving motor vehicles, the Bournemouth Gas and Water Company take a leading place. They have arranged within their district ten filling stations—five of which are available day and night, and five during the day only. In each case the station is fitted with 2-in. connections and flexible pipes; and the gas pressure is sufficient to fill a 500 c.ft. container in from eight to ten minutes. Attention is drawn to the stations by means of prominent signs in white letters on a red ground. In view of the practical impossibility at the present time of getting meters of a suitable size for the purpose, the Company are arranging to charge 2s. 6d. for filling a 500 c.ft. bag, irrespective of whether or not a full bag is taken. In a recent issue of the "Motor," there is a map showing exactly the location of the various stations, with the distances between each.

Some weeks ago there was given in the "JOURNAL" a photograph of one of the Company's lorries fitted with an improved form of container, consisting (in place of a complete bag) of a wooden tray 18 in. deep over the whole of the top of the vehicle, which is rendered gas-tight with several layers of painted and shellaced canvas. Over this, there is fastened a dome-shaped piece of rubbered canvas, which rises to a height of about 18 in. above the top of the tray. This forms a cheap and steady gas container; while its neat appearance is shown by the accompanying photograph, which Mr. Philip G. G. Moon (the Acting-General Manager of the Company) has just forwarded, of an omnibus belonging to the Corporation of Bournemouth fitted with a container of this type.

Saving Light and Heat in Germany.—As showing the straits to which they are brought in Germany at the present time, in consequence of the shortage in the coal deliveries and the drain on the youth of the country caused by the demands of the war, it is significant that, as recently as the 10th inst., all the banks in Frankfort united in advertising in the local Press the fact that, owing to the depletion of their staffs and on account of the absolute necessity of economizing in heating and lighting material, the whole of their establishments will be closed as regards business from 1 o'clock each day.

SCOTTISH JUNIOR GAS ASSOCIATION.

[EASTERN DISTRICT.]

Lecture by Mr. W. R. Herring.

The Opening Meeting of the Fourteenth Session of the Association was held in the Heriot-Watt College, Edinburgh, on Saturday.

Mr. J. J. Scott (Lower Largo), who presided, said this was the third occasion on which he had had the pleasure of thanking them for appointing him President. The lecturer that day was well known in the gas profession, especially in the Eastern district, since he was for many years Gas Engineer to the Edinburgh and Leith Gas Commissioners. Though Mr. Herring now conducted his business in London, they felt that they could still claim him as a member of the Scottish Junior Gas Association. Mr. Herring had delivered a lecture to them in 1909; and it was he and Mr. Masterton who were instrumental in forming the Association in 1904. It was, therefore, peculiarly appropriate that they should have both these gentlemen present to see the vitality of the Association they formed fourteen years ago. [Applause.]

Mr. W. R. Herring, after thanking the President for the very kind manner in which he had introduced him to an audience, among whom he felt no stranger, proceeded to deliver the following lecture entitled

SOME NOTES CONTRASTING GAS PRACTICE DURING THE PAST TWENTY YEARS.

When your President, Mr. James J. Scott, wrote asking me to appear as the lecturer at the opening meeting of the Association to-day, my first desire was to excuse myself, as there are so many calls on one's time at the present moment that it is natural to avoid taking on additional obligations. Second thoughts, however, persuaded me to accept the honour; but I explained to him that I had not the faintest idea what to lecture about. It afterwards occurred to me that, without much effort, I could put together a few scrappy notes, contrasting some of the great changes that have been made in gas practice during the past twenty years. Your Secretary was good enough to say he thought this might prove very interesting, which I hope it may. He also suggested that special reference might be made to the composition of the gas as supplied in the past and as supplied now, and what may be considered as the most satisfactory to supply in the future.

I am therefore proposing to deal with this question first. When I first came to Scotland, I was responsible for the supply of gas of from 26 to 28 c.p., as tested by the flat-flame burner. I had previously been associated with the supply in the North of England of an 18 to 20 c.p. gas, as tested by the No. 1 argand burner. I had also been associated in the South of England with the supply of 14 c.p. gas as tested on the No. 1 argand burner. My movement from the South of England to the North of England, where the luminous value of gas was much higher, impressed me in so far that candle power appeared to be somewhat of the nature of an "optical delusion," so far as the consumer is concerned, as the public and private lighting was equally satisfactory in both places as far as illumination was concerned. In my movement to Scotland, where a very much higher grade gas was supplied, I was still more convinced that the initial candle power of the gas made little, if any, difference to the general effect of public and private lighting; for the simple reason that the 14 and 15 c.p. gas of the South of England was used and consumed at the rate best suited to develop its lighting efficiency. As one moved to the higher grades, however, a less quantity of gas was used by the adoption of smaller burners, and in many cases relatively a poorer light was the result, with a lower economic efficiency.

I need not remind you that the standard of comparison with all gases is based on the assumption that 5 c.ft. of it is employed to render the given candle power. Economically, the higher grade gas, by using less of it, did in some respects save the consumer; but for reasons with which I will hereafter deal, the saving was not always equal to the higher cost of manufacture. For very many years past, the gas industry has been dominated by the luminous flame test; and in later years its development was in consequence considerably retarded. So long as the luminous flame was the only means of obtaining light, it was a fair test, although it must be remembered the burner used for determining its value was seldom, if ever, used by the public. With the advent and popularizing of the incandescent burner, luminous value ceased to be of any particular importance, excepting to the gas manufacturer, and to him only as a means of determining the relative value of the different classes of coal he used. Up to this time, there were few works that had accumulated any records of the calorific value of the gas they supplied, and upon which the efficiency of the incandescent burner, as well as the other appliances used in its consumption, mainly depends. It was, however, generally known that a higher candle value gas also gave superior results when properly consumed, in both the incandescent burner and other appliances.

Twenty years ago, the average quality of the English gas was from 14 to 16 candles by the No. 1 argand burner test; whereas in Scotland, the quality would be (say) from 25 to 28 candles, as determined on a flat-flame burner. In the early days, the upright incandescent burner yielded well over 30 candles per foot of gas, burning between 2·89 to 3·4 c.ft.; the calorific value ranging from 560 to 640 B.Th.U. gross. The only point I need mention with regard to this is that in these tests the incandescent burner was regulated and used to yield the highest efficiency with the gas consumed at the moment. It may be stated that the upright incandescent burner employed on a 20 c.p. gas of about 670 B.Th.U. calorific value consumed much less gas than when using it with (say) a 15¼-candle gas of 572 B.Th.U. calorific value.

The apparatus employed to utilize the gas, excepting for flat-flame lighting, was made to comply with the common English standard of gas value. Where the same apparatus was put into use in localities that did not conform to the common English standard, it proved to be unsatisfactory and uneconomical, unless careful adjustments were made, as well as means for increasing and controlling the admission of air to the bunsen tubes. The same remark applies to the advent of the incandescent burner. These burners were all originally designed for the Continental standard quality of gas, and at the most for a gas of no higher standard than the common English quality. When such burners were used in the North of England and in Scotland, without the introduction of smaller nipples or greater means for air control, they proved to be very unsatisfactory, causing a deposit of free carbon on the upper part of the mantle, which resulted in its early fracture—this in itself, indicating improper combustion—with the result that not only was the lighting efficiency depreciated, but there was always evidence in the atmosphere of the apartment in which the gas was burning of incomplete combustion, excepting where the most scientific adjustments and adaptations of the nipples were introduced. Perhaps the most striking illustration of this point was when we first attempted to adapt the inverted burner for public lighting in Edinburgh. Our early experiments were anything but satisfactory; but after devoting some time to experimental work, we found it necessary to standardize a nipple with extremely small apertures, and more particularly as we found that 2 c.ft. of gas was sufficient to give very satisfactory lighting results. If we accept the principle that a high luminous value gas is also a higher calorific value gas (which it undoubtedly is), the question arises as to whether it is more economical to produce the high-grade than the low-grade gas, always supposing that your apparatus is capable of developing the initial efficiency of the gas used.

Soon after coming to Edinburgh, I carefully investigated the relative cost of manufacturing 26 to 28 c.p. gas and 20 c.p. gas; and with the price of common coal—cannel and shale then prevalent—it was not commercially shown to make any very material change in the price to be charged for the gas. This was in the days when cannel was being displaced for enrichment purposes in the English gas-works, and when it could be picked up at comparatively low prices—say, twice the price of common coal—in the neighbourhood of its production. A similar investigation to-day would, however, yield startling results. If it were required to manufacture even a 20 c.p. flat-flame gas to-day, the price would be prohibitive, even if there was material available to produce such a quality, which there is not.

The Calorimeter.

Twenty years ago, there were probably not ten calorimeters in the gas-works of the United Kingdom; to-day, no works should be without one, as it is the only means by which a standard of quality of any utility can be determined. The conditions arising out of the war have very much accelerated the acceptance of the calorific standard; but considerable controversy has arisen as to what is the calorific value of the various grades of gas supplied in the past. Some information bearing upon this point was, in 1906, communicated by me to the North British Association of Gas Managers; and my investigations then, and those since made, clearly show that, provided there is no disturbing factor arising in the method of manufacture, a coal or cannel gas does rise in calorific value closely in proportion to its luminous value—*i.e.*, a 14-candle gas has approximately a known calorific value, a 16-candle gas tested by the same means and manufactured in the same way would be higher, and so on up the scale. The highest reading I found with 20¼-c.p. gas (No. 1 argand burner test) was 657 B.Th.U. per c.ft.; a 25-c.p. gas (flat-flame test) would run to about 725 B.Th.U.; and a 30 c.p. gas, 800 B.Th.U.

To a considerable extent the misconception as to the relationship between candles and calories is due to the omission to recognize the fact that the luminous value of a gas depends primarily upon only 4 to 7 p.ct. of light-giving elements; the remainder of the bulk being heating gas only, which, after the elimination of the lighting elements, has its own calorific power unchanged unless the gas is diluted with some non-combustible matter. You have no doubt read of arguments dealing with the number of calories or B.Th.U. per candle of illumination; and so long as the normal candle values formerly supplied—say, 14 to 18—are kept in view, it is not an unfair way of stating a simple fact. But you must for ever keep in mind that if you completely strip a gas of its luminous value, you still have a high calorific value left. As a matter of fact, a stripped gas ranges from 450 to 500 B.Th.U., and has a test candle value of 6 to 7 c.p. on the No. 2 burner.

The War and the Calorific Standard.

The demands made upon the industry by the Government in the early days of the war, and still continued, have compelled the acceptance of the calorific standard by gas undertakings throughout the country; and having established by law the 500 B.Th.U. standard of value as the quality of a town's gas supply in so many cases, coupled with the release from the obligations to test in all localities during the war period, abundant evidence has been accumulated to show that, where such a gas has been

supplied, the public demands have been reasonably met for all purposes for which gas is now used. Many instances can be given where a very much inferior quality has been supplied to the extent of as low as 450 B.Th.U.; but where this has been the case, considerable dissatisfaction has been manifest, and very unsatisfactory results obtained from the use of such a gas.

Non-Combustible Matter.

This low calorific value has not been obtained by natural means, It has been brought about by over-exhaustion, and consequent adulteration with furnace gases and atmospheric air; even to the extent, in some cases, of as much as 40 p.ct. of non-combustible gas has been found by testing the supply in some localities in England. The practical result of this to the manufacturer has been a largely increased yield of so-called gas per ton of coal, and a largely increased bill to the consumer, who has received his normal gas *plus* this varying percentage of non-combustible matter. This. however, is not the worst side of the case. The effect upon the flame temperature of a large volume of non-combustible gas is very serious indeed, and affects all purposes for which gas is used. There is a further disadvantage—the flue exits for many types of apparatus are insufficient to carry away the products of the increased volume of gas that had to be consumed to get the same heat equivalent *plus* the adulterants, not to mention the possible effects of the presence of oxygen in the interior of the distributory system with other elements that go to produce corrosion and its ultimate destruction.

I was so convinced of the error of this practice, and the serious effect it was having upon the gas industry's future, that I did not hesitate to communicate my views to the Technical Press, condemning the practice and pointing out an alternative. The question was also raised by some of the public authorities with the Board of Trade, with the result that the Board have referred the matter to the Fuel Research Board to conduct, on behalf of the Board of Trade and other Government Departments concerned, investigations into certain technical questions connected with the supply of gas, &c. This matter is now in the hands of the Fuel Research Board, which, you may know, is under the able Directorship of Sir George Beilby.

The question therefore at the moment is whether the gas industry is to accept the 500 B.Th.U. as the most economical standard of gas to supply, or to attempt to reduce this value, as has been done in one case recently, which was not successful. My own experience as a consumer is decidedly against the character of gas that I was supplied with from two different sources during last winter; but as both of these sources were highly contaminated with adulterants in the form of non-combustible matter, the practical conditions may have been even worse than had the gas been of a lower calorific value but all of a combustible nature. It is now established as a scientific fact that the efficiency of gas as used to-day depends primarily upon its calorific power; and if the calorific value of a supply is reduced by (say) 10 p.ct., then to get the same efficiency, 10 p.ct. more gas must be consumed. This statement was given in evidence by Prof. Bone and Prof. Smithells, both of whom appeared on opposite sides in a case with which I was connected; but if the gas is largely adulterated with non-combustible matter, the real loss is much greater.

We have here, therefore, a simple proposition in arithmetic—whether it is cheaper to supply the one quality or the other. If we lower the calorific value overmuch, the distributory system—our mains, fittings, and appliances—must all be capable of passing more gas in proportion as its calorific value is lowered. If we approach too nearly the calorific value of (say) Mond gas or producer gas, then it will no longer be economical to manufacture gas by our present methods, as, in the return of sulphate of ammonia alone, the Mond gas progress will yield us four times the amount of our present system of carbonization. The question therefore arises as to the value that can be obtained from the ordinary coal used in gas manufacture, and carbonized under normal conditions without over-exhaustion, and consequent admixture with furnace gas. My own experience tells me that, under such conditions, the poorest coals in Scotland will not yield a gas of as low a calorific value as 500 B.Th.U. If this is the case, then there is no reason why this standard should not be adhered to, if it can be shown on economic grounds—and by this, I mean the consumer to have cheaper gas—that it will be better to supply a larger quantity of a lower-grade gas than 500 B.Th.U. The question remains as to how this is to be brought about.

The Advantages of Blue Water Gas.

In condemning the practice of adulterants in some correspondence to the Technical Press, I pointed out a means to this end. It is not new—it has been spoken of by many in earlier days; but so long as the candle value was dominant, it was impossible of application. Now that calorific value is accepted as the test, however, the practice of admitting various percentages of blue gas (produced from coke by the breaking-up of water vapour into its constituents in its passage through a mass of heated carbon, commercially known as "water gas," to distinguish it from the luminous gas arising from carburetted water gas) is now available, and has proved in practice to be efficient and advantageous. In itself it starts with an initial value of 300 B.Th.U., and by very simple means, if necessary, can be slightly carburetted so as to be of an even higher value. But taking it in its virgin state, it has been found in practice (and where it is mixed with the coal gas in the foul main) to be possible to add as much as 33 p.ct. by volume, and still obtain a calorific value in the bulk of 500 B.Th.U. from a normally produced coal gas from ordinary coal, and yield a gas containing from 90 to 93 p.ct. of combustible matter. Those who have experience with water-gas plants know their simplicity and convenience, the small space occupied, and their hardihood when subjected to intermittent working, which such plants have generally been put to in the past. If we add to this the possibility of using oil in after-war times (which in my view will be the first article of commerce to slump in value on the conclusion of peace), we have a means of economical production, and one that gives us very considerable elasticity in the choice of materials used in the manufacture of gas.

Speaking only of blue gas, however, it offers many collateral advantages. It reduces our purchase of coal, with the difficulties that may accrue from it; it also places us in the position of requiring not to store so much coal, of which we not only lose in its initial value, but in the cost of the capital so sunk. The raw material used to make this gas is produced on our own works, in the form of coke; and the carbonizing of less coal consequently yields less coke for sale, as by the use of (say) 4 cwt. of coke we produce the gas equivalent of one ton of coal—thus in two ways reducing the available coke for sale, and obviously enhancing the value of the remainder. Wear and tear upon the plant is much less; labour is much less (particularly in dealing with small and medium-sized works); and as there is little prospect, in my view, of the price of coal after the war being much less (if any) than it is now, it seems to me to be the only course left open to the present-day gas manufacturer to enable him to produce in the future at anything approaching costs and charges that he has been accustomed to prior to the war.

When some of the earlier applications for the establishment of a calorific standard in place of a candle standard were before Parliament, Parliamentary Committees exhibited a reluctance to abandon altogether luminous value in the flat-flame burner, primarily on the grounds that there were many circumstances and situations where flat-flame burners must still be employed; and while the candle as a standard of quality was statutorily abolished, in the particular case referred to permissive provisions were inserted in the Bills to continue to test with the flat-flame burner for information only. The conditions arising out of the war have given us opportunities of investigating matters which could not under normal conditions ever have been attempted, and much useful information has been gleaned—now based on an extended period of practice, which formerly had to be based upon experimental research and the judgment of the experimenters.

Benzol Recovery.

The total or partial stripping of a town's gas supply for the recovery of benzol, &c., such as is in vogue now in many works, has revealed much useful information; and it may be interesting to give a *résumé* of its effect upon the supply over a large area, and during a lengthened period, in Scotland. The results are given in summary, having been compiled from the month's average of daily tests and records, and is itself the average of thirteen to fourteen months' working.

Summary of the Effect of Stripping a Town's Gas Supply for Benzol, &c., giving Losses due to Extracting the Luminous Elements and their Effect on its Candle Power and Calorific Value.

Calorific value before stripping . . .	B.Th.U.	570	
,, after ,, . . .	,,	533	
Loss . . .	,,	37	= 6·48 p.ct.
Luminous value before stripping . .	candles	14·83	
,, after ,, . . .	,,	7·12	
Loss . . .	,,	7·71	
Flat-flame value at 5 c.ft. rate . . .	candles	2·42	
Distilled products yielded	gallons	1·81	

An interesting feature with regard to this is that stripping to the utmost possible extent does not totally destroy the apparent luminous value of a gas. I find from very careful investigation that a gas yielding a candle power of from 14 to 15 when tested on the No. 2 argand burner before stripping, yields from 7 to 7½ c.p. on the same burner after stripping, and from 2 to 3 candles on a flat-flame burner. Messrs. Bray & Co. do, in fact, make a special burner for stripped gas; and this I find at the standard rate of 5 c.ft. consumption yields 34·8 p.ct. of the light as ascertained on the No. 2 argand test burner. The burner is not in this respect much better than the other ordinary slit flat-flame burners on the market.

One very interesting fact was revealed by carrying the experiment a stage further. Two No. 11 market slit burners were adjusted so that the flames should impinge one upon the other, and each regulated to burn gas at the rate of 5 c.ft. per hour. By using only one burner, a 7·6-candle gas (argand test) yielded 3·19 candles of illumination at the 5 c.ft. rate of consumption. By lighting the second burner and allowing the two flames to impinge one upon the other—the consumption of gas being at the rate of 10 c.ft. per hour jointly—the twin burners yielded 9·64 candles, or nearly one candle per foot of gas, and showed very superior results to burning the gas in a single flame. The test was repeated

more than once, so that there might be no doubt in expressing an opinion as to the possibility of obtaining all the light that is reasonably necessary where gas must be burned as a luminous flame; and the results were in each case confirmed.

It therefore seems that a stripped gas can, under certain conditions, be consumed by this means in order to give satisfactory lighting in the special situations where the incandescent mantle is unsuitable. It must, however, be borne in mind that if such gas is so burned in order to yield luminosity, the consumption will be very much greater than in the past. Where, however, a luminous flame is required as a guide—such as a marine light or navigating light—as distinct from a means of illumination, the ordinary flat-flame burner may be still sufficient for the purpose, as it can be relied upon to yield from 2 to 3 candles of illumination. Admittedly this quality of gas looks extremely thin when burning; but a photograph which I have here of such a flame consuming gas at the rate of 5 c.ft. does, I think, establish the fact that it will serve the purpose in the situations where the incandescent burner is considered unsuitable.

Labour-Saving Machinery.

I have already referred to the practical operations of gas manufacture in the past being dominated by the necessity of living up to a luminous value test; and such conditions have obviously largely controlled manufacturing methods. Time will not permit of my making reference to the chain of improvements in retort-house practice during the period under review, except to briefly refer to the most notable, which, in my view, is the application of labour-saving appliances in the handling of both coal and coke in all types of retort-house practice; and where such appliances have not already been introduced, the present and probable future conditions of labour are such that they will have to be introduced, and even more elaborated than they are at present. There is scarcely a purpose where solid material is handled on a gas-works, even of medium size, where mechanical means for handling cannot with advantage be introduced; and scant sympathy can be shown to those undertakings that continue the Indian coolie method in this respect.

Vertical Retorts and Calorific Value.

The most notable change in carbonizing practice is the practical application to gas-works conditions of the vertical retort, of which you are all very familiar in the oil-works practice. This advance was rendered possible by the more general recognition of calorific value and the abandonment of luminous value; and had it not been for the reversion to the conditions laid down in the City of London Gas Act of 1868, the road for the progress of this important method of carbonizing would have been blocked. I may remind you that the clause in the Act referred to prescribes "that the test burner shall be the most suitable for obtaining from the gas the greatest amount of light, &c."

It was notorious twenty years ago that the test burner then in use did no such thing. But the agitation started at the close of the last century, and continued well into the present, paved the way for the introduction of the No. 2 argand test burner. This, in essence, is in most respects similar to the old burner; but with this important exception—viz., that a diaphragm or damper is introduced by means of which the air supply to the flame can be regulated to just the required amount to properly consume the gas as a luminous flame. Experience afterwards showed that the old test burner had been recording a value of anything from 3 to 5 candles less than when the gas was tested under the conditions originally prescribed by Parliament in the 1868 Act; and it was this difference in the method of testing which enabled the various types of vertical retorts to respond to present-day requirements.

The vertical retort need not be described by me. Its home is in Scotland, and its adaptation to coal gas practice is familiar to you all. I may just mention that vertical retorts lend themselves admirably to the production of small volumes of water gas, without additional plant, by the admission of a regulated drip of water, or exhaust steam, at the point of discharge where the hot coke is removed. In this respect the retorts will yield water gas on a much more economical basis, so far as fuel consumption is concerned, than in a self-contained plant, as there will be no loss due to heating up the fuel bed, and the latent heat in the coke will be taken advantage of in converting the water into steam. An additional yield of ammonia will result from this practice.

The Outlook for Cannel.

I shall pass lightly over the change in the character of the material used in Scottish gas-works. Twenty years ago, probably 60 to 70 p.ct. was cannel or shale, and mostly of a non-coke producing character. To-day, I suppose none employ either of these materials, except under compulsion, with the result that the use of common coal in Scottish works has been very largely increased, resulting in a great augmentation in the amount of coke or cinders available for sale. Notwithstanding this increase, it cannot be said that the market for coke up to the time of the war was in any way congested, and that, on the basis of value in relation to cost of coal, the price had enhanced rather than otherwise. In many respects the cannels and shales have been left below ground; but the day may be quite near when their output will be renewed and even increased. There is a large field for their use, but not I think in gas-works. The oil-works as we know them to-day may or may not be the ideal method; but we all know their inherent value, and some commercial use will, I firmly believe, quickly mature.

Little of note has taken place in the process of manufacture between the retort-house and the purifiers, unless I may mention the advent of that obnoxious element naphthalene. This has made itself manifest in Scotland primarily owing to the abandonment of the use of coals yielding vapours of the paraffin series. Paraffin vapour or spray is the best solvent for it; and where there are stoppages, it is the best element to apply in any form that is practicable. Lighter oils and spirits will dissolve naphthalene, but will merely carry it to some other place, and in a shorter or longer time will themselves have been evaporated by the passage of the gas over it; and the naphthalene will be again deposited. Their use, therefore, results in an accumulative deposit; whereas the paraffin will hold it in solution, and it can be removed from the syphons.

Purification.

A considerable change has taken place in the material used in the purification of gas. Twenty years ago, Scotland was wedded to lime purification, notwithstanding the fact that there was no reason why it should be used for the elimination of the bisulphide of carbon, such as was the case in England. I never found in the many tests that we carried out that the bisulphide of carbon element was ever in excess of the quantity prescribed as the minimum in the English Gas Acts. I think Portobello may have been the first works to use exclusively oxide of iron for gas purification. As a result of this, it was ultimately wholly adopted on starting the new works at Granton. As you have all had experience of this, I need not say more in passing than perhaps refer to the present-day difficulties in obtaining the material. Some that I have seen is calculated to give very considerable trouble during the coming winter, and will not, so far as my experience elsewhere teaches me, absorb anything like the 50 p.ct. of sulphur that is customary.

Activity in the Sales Department.

The constructional extensions of gas-works during the period under review have been mostly of a minor character, owing to one or two general causes. The first was the admitted check in the consumption of gas due to the introduction of the incandescent burner, and perhaps, in a much less degree, the competition of electric light. This resulted in greater energy being devoted to the sales of gas, and its utilization for other purposes as well as for lighting. In its turn, this development in the use of gas magnified or increased the day-load as distinct from the lighting-load, with the result that a works of given maximum daily capacity was able to meet the increasing demands upon its establishment by the utilization of its plant over a greater period of the year than in the old days, when a year's output was reckoned to be satisfactory if it represented the employment of the plant for 200 full working days.

For instance, in 1900, taking all works enumerated in "Field's Analysis," the annual sale represented 200 maximum working days' output; whereas in 1915 the three London companies increased their year's working to 236 days, and the London suburban companies to 258 full working days. The Provincial corporations advanced not nearly so rapidly; but the English companies advanced equally as rapidly as the London companies. The increase in the gas output during the last ten to fifteen years has been almost entirely met by utilizing the plant that was in existence at the beginning to a greater degree in the period under review.

There is another factor which has weighed in this respect, and that is the increased make of gas per ton of coal used. These points and some others have, however, retarded in a large measure the constructional development of many undertakings, and have to some extent retarded the introduction of modern appliances. Thus the engineering side of the business has experienced a pause, while the commercial side has come into full activity.

The realization that a gas undertaking is a commercial proposition, speaking in the broadest sense, has received full recognition during the period under review. There never was more activity displayed in the sales department than has been the case now for some years past. It is still capable of very considerable development; and although the price of the product has been advanced, it has only been advanced proportionately, if as much, as other fuels. Furthermore, it cannot be shown to have retarded consumption. The working classes, who are the backbone of the business, were never better off, and, consequently, better able to take advantage of the facilities and economy which gas offers in domestic affairs. It is also evident that the scale of wages common before the war has now passed into history. The workers will undoubtedly continue to receive much higher wages than heretofore, and the future prosperity of the country will depend upon their willingness to produce all they possibly can in the hours allotted to work.

For some years past the consumers' wants have been studiously considered. Their lighting and other appliances have been put under periodical supervision, and renewals have been supplied, at the lowest possible cost. In many cases, appliances for using gas have been loaned to the consumer free of hiring charges; and so long as there is a guarantee of use, the policy is a good one.

The practice of the gas undertaking purchasing all and sundry requisites, which they can do as wholesale dealers, and retailing them to the consumers at a bare cost price, must be followed in the future more than in the past. The object should be to manufacture gas and give every facility for its use, charging in the price for the gas all sums necessary to cover the cost of the free services rendered.

Industrial Development.

I have refrained from mentioning the enormous industrial development in the use of gas, which even before the war was coming surely, if slowly. The emergency of war has given this an impetus which it is hoped every step will be taken to retain after war times. What is necessary, even more so for industrial use than any other, is a steady quality at a constant pressure; and it behoves those responsible for the distributory system to satisfy themselves that these conditions are being met before a consumer has cause to complain. Much damage may arise to partly finished material if from any cause, such as excessive consumption in an inner area, the supply to an outer area is reduced.

Fuel Research.

Time prevents one dealing with many other matters that come to the mind—in fact, it is presumptive to suggest that what has happened during the past twenty years can be summarized in the course of one lecture. In closing, therefore, I shall mention a matter which is pregnant with great possibilities for the gas industry and the public generally. You may know that the Fuel Research Board has been organized, under the able directorship of Sir George Beilby, to carry out the purposes which its designation implies; and in the report just issued by the Board, a scheme of research is outlined and the establishment of a Fuel Research station is dealt with. The scheme, the report states, can only be efficiently carried out in a station designed and equipped for the purpose, in which operations on an industrial scale can be undertaken under proper working conditions. It was realized that the necessary conditions could only be fulfilled by a site in the neighbourhood of a large gas-works; and some months ago the Director of Fuel Research approached Mr. Charles Carpenter, D.Sc., the Chairman of the South Metropolitan Gas Company, on the subject. Following this conference, Mr. Carpenter, on behalf of his Company, made the following offer to the Fuel Research Board: To lease to the Government, at a peppercorn rent, sufficient land at the East Greenwich Gas-Works, for the erection of a research station; to prepare drawings and specifications for the station on lines to be laid down by the Board, and to make contracts for its erection; to give every facility for the transport of coal and other supplies to the station; and to take over, at market prices, the surplus products—gas, tar, liquor, and coke—resulting from the operations at the station. After further conferences, a suitable site was agreed upon. The proposed site is a strip of level ground about 250 ft. wide by 700 ft. to 800 ft. long, situated on the main siding which connects the gas-works with the South-Eastern Railway, and with access to an existing road.

The thanks of the industry are due to Sir George Beilby and his Board and to Mr. Carpenter for his public-spirited act; and provided the station in question is organized and directed by men capable of bringing to bear both science and practice on the operations, much good may result in the near future, not only to the gas industry as a commercial proposition, but to the country at large in the broadest sense of the term.

DISCUSSION.

The President said they had listened to a lecture which, for clearness, wealth of information, and retrospective quality would rank as one of the most valuable that had been delivered to the Association. The lecture was most opportune at the present time, as it gave those engaged in the industry just the warning, advice, and information they required. The death-blow of the illuminating test had been struck; and consumers had not suffered by its absence. Now they found a diversity of opinion as to whether a 500 B.Th.U. gas was the most suitable to supply. Mr. Herring had dealt in an admirable way with the question of non-combustible constituents of gas in relation to large makes per ton, and also in relation to the calorific power of fuel gas. It was unfortunate that the consumer had to pay for 100 c.ft. of so-called gas, of which 30 to 40 c.ft. was useless to him. Mr. Herring advocated the use of water gas to mix with straight coal gas in such proportions as would give a regular calorific power gas, and in which non-combustible matter did not exceed 10 p.ct. Mr. Herring's lecture would do much to decide what was to be the gas of the future.

Mr. A. Masterton (Granton) said it was a great gratification to him that he was present to renew his acquaintance with the Scottish Junior Gas Association, of which he was the first President. He congratulated them upon securing Mr. Herring to lecture, because he had a wide professional experience of all matters connected with the gas industry. The subject was a most important one, especially at the present time, when gas practices were in a state of transition. The investigation which Mr. Herring had completed would be very useful for reference. As to the utilization of gas for motor traction, his Commissioners were doing everything possible to develop this. Most of the buses plying between Edinburgh and the surrounding districts were fitted with flexible gas-tubes. At present, they ran about 80,000 miles per month; and of this, 68,000 miles were accomplished on gas. Each bus carried from 700 to 800 c.ft. of gas, which enabled it to cover a distance of from 16 to 18 miles. The consumption was about 45 c.ft. per mile. Taking the gas at the present rate in Edinburgh, the cost worked out at about 2s. 6d. per run of 18 miles—less than 1⅞d. per mile for gas. From 250 to 280 c.ft. of gas, costing 1s., was equal to a gallon of petrol costing at present 4s.

Lieut. Lawrence Farquhar (a former Secretary of the Association) moved a hearty vote of thanks to Mr. Herring for his lecture.

Mr. William Geddes (Granton), seconding, said they were all pleased to see Mr. Farquhar recovered from his recent wounds. Speaking as one who had been privileged to serve on Mr. Herring's staff, he could say that Mr. Herring was one of the new school of gas engineers. While holding firmly to all that had stood the test of time, he was always tentatively endeavouring to anticipate what was to be the best in the near future.

Mr. Herring, in reply, said he was amply rewarded if they had been interested in what he had said. They were living in stirring times; but after all they were not put into this world to have a quiet time of it. He never had; and he had taken care, speaking confidentially, that no one who had anything to do with him had a quiet time either. [Laughter] They were in this world, he believed, to fit themselves for something better. At any rate, they were here to fight. Taking the matter philosophically, it did not matter what they were fighting, so long as they were fighting, and had their eyes firmly fixed on what they were aiming at.

Cracking Hydrocarbon Vapours.

According to the "Chemical Trade Journal," a process, which aims at producing by means of an electric discharge a greater yield of fixed gases from hydrocarbon vapours is the development of Messrs. J. G. Davidson and R. W. Ford, of Vancouver, B.C. United States Patent No. 1,229,042 has been granted covering the discovery that by passing such vapours through an electric brush discharge field the amount of non-condensible gases is increased. In actual tests, it is claimed that by the process the amount of CH_4 in the gas has been increased from about 25 p.ct. to approximately 40 p.ct.; while the amount of C_nH_{2n} was increased from between 7 and 10 p.ct. to between 20 and 23 p.ct. Ordinarily, the gas is conducted through a number of conduits formed as vertical pipes, connected at their lower ends to a supply header, and at their upper ends to an outlet header; the discharge electrode being formed as wires hung axially in the pipes from an insulated support. The pipes are grounded, and the electrodes are connected by a wire to a mechanical rectifier of the usual rotary type, included in the high-tension circuit of a step-up transformer—the rectifier being connected to ground.

Industrial Reconstruction.

A scheme which is the outcome of suggestions that have been made during the past three years for the organization of our industries and the development of our trade and commerce, has been forwarded by Mr. F. W. Galton, the Secretary *pro tem.* of the Council for the Study of Industrial Reconstruction. The scheme is set forth in a manifesto, having a large number of signatories, including many well-known University professors, editors of trade papers, and officers of trade associations. A meeting will shortly be arranged for the further explanation of the proposals; and meantime all inquiries will be dealt with by the Secretary, at the offices of Messrs. Benn Bros., Ltd., No. 8, Bouverie Street, E.C. It is urged that the necessity for greatly increasing the national output is so imperative that the matter cannot be left to chance, and the responsibility cannot remain with individuals. It thus becomes necessary to adopt some national scheme which shall ensure the securing of these objects. The interests of both capital and labour are equally at stake. Although we depend upon our industries, they have no place in the Constitution. There is a national interest in trade and industry which is not at present recognized. The suggestion made, therefore, is that there should be established a national organization, on lines such as those indicated by the Whitley report; provision being made for the representation of all classes of persons engaged in a given industry, by means of a vocational franchise, which would make possible the organization of each trade separately under a Trade Council composed of capital and labour. It is also proposed that a Government Department should be established to promote or encourage trade. In brief, the scheme involves the establishment of a complete new system of trade government comparable with our existing system of local government, with a Ministry at the head, having powers similar to those of the Local Government Board, controlling numerous Trade Councils with powers comparable to those of existing County Councils. It recognizes the essential principle that industrial interests should be grouped by trades, and not by localities.

National Gas Council.—A meeting of the National Gas Council will be held at the Central Hall, S.W., next Tuesday, at 3.30, to consider a report of the work done since the last meeting of the Council.

Gas Companies' Protection Association.—The annual general meeting of the Association has been fixed for Thursday of this week, at 2.30, at Caxton Hall, Westminster, S.W. The business of the meeting will be to receive the annual report of the proceedings of the Association and the accounts and balance-sheet for the year, to elect six members of Committee in place of those retiring, &c.

Lessing's Benzol Extraction System.—It will be remembered that Dr. Lessing's patent process for extracting benzol by utilizing an oil-impregnated absorbing material in a scrubber has been in operation at the Crowborough Gas-Works, and excellent results, it is understood, have been obtained. The process is also being adopted at Tonbridge by Mr. James Donaldson. Owing to shortage of labour, however, the plant is not yet complete; and it is difficult to say when it will be. The maximum make of gas at the works is 750,000 c.ft. per day; and the plant will deal with this volume. There is practically no apparatus required, apart from the scrubbers containing the absorbing material.

MIDLAND JUNIOR GAS ASSOCIATION.

The Opening Meeting of the Association for the present session took place last Thursday evening, in the Council House Reading Room, Birmingham; the chair being occupied at the outset by Mr. J. C. PEARSON, the outgoing President.

After the HON. SECRETARY (Mr. W. J. Pickering) had read the minutes of the previous meeting, and announced the election as honorary members of Mr. S. R. Barrett and Mr. A. W. Smith,

Mr. PEARSON remarked that it was his duty, as retiring President, to introduce the new President, Mr. R. G. Marsh. He was quite sure that Mr. Marsh would grace the office, and carry on the Association in a way which would not only equal, but no doubt exceed, former traditions. Mr. Marsh was making for himself a name on the distribution side of the Birmingham Corporation Gas Department. It was, of course, necessary for such a large gas undertaking as that of Birmingham to have both a distributing and a manufacturing section. The Association had always made an effort to arrange that on the Council, and as President, there should be alternately a manufacturing man and a distribution man, as it had been felt that it was greatly to the advantage of the Association to keep both factors before them. Of course, the two sections were intimately linked together; and it was a very good thing for those on the manufacturing side to be able to rub shoulders with the men on the distribution side, and so keep themselves up-to-date regarding the branch of the industry which otherwise they might find themselves getting stale upon. They could never tell when the time might arrive at which they would need to have good acquaintance with all aspects of their profession. Equally, it was advisable for the distribution men to learn what they could about the manufacturing side. In Mr. Marsh the Association would have a President who would put forward the side the manufacturing man wanted to know; and he would also help those on the distribution side.

Mr. R. G. MARSH, on taking the chair, acknowledged the cordial manner in which the members had received the kind remarks of Mr. Pearson. He then proposed a very hearty vote of thanks to Mr. Pearson for his labours as President. They all, he said, knew how difficult it was at the present moment, when things were so extremely busy, to give much time to the work of such an Association as theirs; and they must all be deeply grateful to Mr. Pearson for the way he had conducted the past session, which had proved so successful.

Mr. T. H. POULSON (Stafford), who seconded, agreed that Mr. Pearson had bestowed a great deal of attention on the work of the Association, and on the needs, not only of the present members, but of those who were coming along. He had followed Mr. R. J. Rogers on the question of the education of gas-fitters and juniors generally.

Mr. PEARSON, in reply to the vote, said it was the Hon. Secretary whom they had to thank most for the manner in which the work had been carried out during the past session.

Mr. MARSH then delivered his

PRESIDENTIAL ADDRESS.

Owing to the stimulus of war conditions, our industry has developed and extended its sphere of usefulness and indispensability to an extent quite impossible under pre-war conditions, and undoubtedly will have benefited in the long run by experience gained and difficulties overcome during the present period. The supply of gas has achieved a position of paramount national importance, by reason of its adaptability and application as a fuel to an infinite variety of purposes and processes in connection with the production of munitions of war—this, quite apart from the invaluable additions to the supply of raw material for the manufacture of explosives secured during the course of its manufacture. The due meed of praise must not be denied to the manufacturers of gas-consuming apparatus, who have devoted their energies to the design and production of furnaces and appliances specially suited to the many and various processes in shell manufacture, and other purposes in connection with the supply of munitions. The increased output of gas during the past three years has been phenomenal, due to the installation of such an immense number of large meters registering gas supplied to new and existing factories engaged night and day in the manufacture of munitions; and it has severely taxed our resources. We have been fortunate so far in being able to cope with the demand; and it is to be hoped that we in Birmingham shall be able to continue to do so, in spite of increasing difficulties, without serious curtailment of the domestic supply.

GAS OUTPUT IN BIRMINGHAM.

A few figures regarding the growth of the output of gas by the Birmingham Gas Department during the last few years may be of interest, though I do not wish to overburden you with statistics, nor to enter into any detailed comparisons. But it is a subject worthy of being brought again to your notice, as illustrating the enormous strides that have taken place in the development of the methods of the application of gas as a fuel for all purposes. Birmingham, situated as it is in the centre of a densely populated industrial district, has had probably the unique experience of exactly doubling its summer output of gas in the short space of six years; and the growth shows at present no signs of abatement. The highest weekly output of gas in 1913 was 267 million c.ft.; in 1914, 282 millions; in 1915, 296 millions; and in 1916, 309 millions. The highest for this year has probably not yet been reached; but the increase to date on the current year, commencing April 1, is 675 millions, or 13½ p.c. on last year's figure. This figure, representing the increase only on last year's output, is greater than the total annual consumption of many of our neighbouring towns.

Among our large consumers, there are several whose requirements practically necessitate a small gas-works in themselves; the gas bills of three of them representing 50, 196, and 290 million c.ft. per annum respectively. It is therefore not without reason that most urgent appeals have been made to the general public to exercise the most rigid economy in the use of gas during the coming winter months, if grave interference with the supply in general, and to important munition factories in particular, is to be avoided. The present state of affairs is causing great concern to our Gas Committee. In fact, it will only be possible to successfully come through our threatened difficulties this year by the realization of the facts by the public, and their active co-operation with us in these anxious times.

INDUSTRIAL RESEARCH DEPARTMENT.

We have in Birmingham a special section of the department which deals with manufacturers upon all questions arising in connection with the heat treatment of metals and other materials, and which also carries out research work in many other directions, with a view to assisting manufacturers upon any point of difficulty met with in the course of their special business. Most of the business carried on by this section is, of course, of a confidential nature; but its services have been found of the utmost value to many firms who have availed themselves of them. The activities of Mr. C. M. Walter, the Engineer-in-Charge, and his assistants are by no means confined to the purely gas-supply aspects of the matters dealt with. The growth and development of the section to dealing with questions whether of a chemical, physical, or electrical nature is the natural outcome of the work of the original section, which was instituted to deal with the application of gas for industrial purposes.

It was soon found, for instance, that, to be in a position to properly advise firms in the selection of a furnace required for the heat treatment of a particular steel, it was necessary to know all about the properties of the steel in question, and to find the proper temperatures and conditions necessary to produce the result required by scientific investigation, instead of rule-of-thumb methods; and to enable such investigation to be thoroughly carried out, the laboratories have been gradually equipped with testing apparatus —physical, chemical, electrical, as well as photographic—till they will now favourably compare with any similar laboratories in the country. Opportunities for such investigation work, especially in a district like Birmingham, are unlimited. The amount and variety of work carried out up to the present shows that this assistance is appreciated by manufacturers who have availed themselves of it; and the scope of the section gives indications of considerable increase.

COAL GAS FOR MOTOR VEHICLES.

The most recent application of gas, which bids fair to become of more and more importance—and which we should have welcomed and endeavoured to foster by every means in our power had conditions been otherwise—is its employment as a substitute for petrol in motor vehicles. The present prohibitive price of the spirit, and the restrictions imposed on its use, are the factors that are driving motor owners to the employment of some other means of continuing the use of their cars and commercial lorries; and coal gas is proving the obvious solution of the problem. We are beginning to get used to the sight of motor vehicles with flexible gas-containers carried on their roofs; and this at present is the easiest and most convenient method of carrying the supply of fuel. The containers are cheap, fairly durable, and easily filled from ordinary low-pressure supplies. Their disadvantage is their bulky appearance and limited capacity, in that all cars are not constructed to accommodate a bag of sufficient size to avail for more than quite a short journey. Developments, however, in this respect are certain—especially when conditions are relaxed to allow of more experimental work in this direction. Very successful experiments have already been carried out in the use of coal gas under high pressures carried in steel cylinders; and I am inclined to think that some method such as this of carrying the fuel under pressure will come into ultimate favour.

Unless petrol is so reduced in price after the war as to be easily able to compete with coal gas on the basis of cost, we may confidently look forward to the time when every garage throughout the country will be also a station where a supply of gas can be obtained. In this connection, it is desirable that some responsible organization should be early in taking in hand the arrangement of the details of a scheme to secure standardization of conditions of supply. When the supply is carried in low-pressure containers, there is little difficulty; but where a supply under high pressure is asked for, there are many considerations to be taken into account. A garage catering for such requirements would require a large container supplied by a compressor, and to pump up to a pressure in excess of that required in the portable containers from which the latter could rapidly be filled. As an alternative, each individual car could be fitted with a small compressor driven by its own engine, to enable it to fill its containers from a low-pressure supply; or, in the case of a multi-cylinder engine, perhaps one cylinder could be temporarily adaptable to act as a compressor, driven by the remaining cylinders. A suitable automatic reducing valve to control the supply from the containers to the engine is necessary; but the application of this, though calling for very careful design and manufacture, is not an insuperable difficulty.

One important point in connection with the supply of gas for this purpose is somewhat liable to be overlooked, and that is the

installing of a meter of the requisite size to correctly measure the comparatively large volumes of gas required over a short period. I am referring now to the low-pressure supplies. It should be borne in mind that a meter of not less than 500-light size is necessary where bags of 250 c.ft. capacity are required to be filled in about five minutes. Where, however, a system is adopted of selling the gas for so much a bag-full direct from the mains, through a valve controlled by a representative of the gas undertaking, the meter difficulty is done away with. But this system is perhaps not likely to become universal. It will be more satisfactory to all concerned to have a more definite system of measuring the actual amount of gas supplied—at least to the nearest 100 c.ft.; and to this end some form of metering is a necessity, owing to the varying capacity of the flexible containers likely to be met with, and also to the fact that invariably they will have more or less of the previous charge remaining in them when stopping to refill. These, however, are points on which more experience in the nature and scope of the business will act as a guide. To my mind, it is most desirable that some organization acting in the interests of the motoring world and gas suppliers should be formed to arrive at general conditions and terms of supply to their mutual advantage.

Naphthalene for Motors.

There is still another substitute for petrol derivable from the process of gas manufacture, in the shape of naphthalene, which is now obtainable at rates considerably cheaper than paraffin. The difficulty in connection with the utilization of this product for the purpose is, of course, that at ordinary temperatures it is in a solid state, and requires to be warmed to a temperature of about 80° C. to liquefy it, and to a higher temperature still before satisfactory vaporization can take place. The utilization of the waste heat from the exhaust gases of the engine immediately suggests itself as adaptable for the purpose; and very successful experiments have already been carried out on these lines. The chamber containing the fuel to be vaporized is jacketed and kept warm by a portion of the exhaust gases being passed through the jacket. The exact temperature to be maintained is important; and this can easily be regulated by a thermostatic device actuating the bye-pass valve from the exhaust.

Though this is not the first attempt at the use of naphthalene for this purpose, there are several points of novelty in the construction of the all-important heating and vaporizing devices of the apparatus in question; and our best wishes for their success are with the inventors in this new departure.

Gas-Meters.

The subject of gas measurement has always been one of interest to me; and I hope that in the near future, when normal conditions are restored, considerable developments in this direction will be made. At the present time, a legal gas measurer to pass comparatively large volumes up to (say) 10,000 c.ft. per hour, is a very costly, heavy, and bulky piece of apparatus; and its installation generally means that valuable floor space is occupied by it which the factory owner can only with difficulty afford. In several cases, under agreement with the consumer, rotary meters with a capacity up to 25,000 c.ft. per hour have been installed; and these meters occupy but a fraction of the space that would have been required by an ordinary meter of the same capacity. The registration of these meters is guaranteed accurate at all rates above 10 p.ct. of their capacity; and under the conditions of their work, the consumption is not likely to fall below this limit. Under normal conditions, these meters appear to be working very satisfactorily; but their general adoption for all conditions is, of course, impossible, owing to their accuracy being only within certain limits of the rate of consumption. They certainly show, however, the advantages of a meter that has a large capacity and takes up so little room. Although, difficult of accomplishment, I hope we shall yet see a meter designed on entirely new lines, that will act as a definite and accurate measurer of volumes under all conditions of temperature and pressure, and at all rates of consumption up to its capacity.

It is difficult to leave this subject without again referring to the serious need of the reconstruction of the Sales of Gas Act, to bring it into line with modern conditions of supply. There are many circumstances existing to-day which it is not framed to deal with, the most obvious of which is the varying conditions of temperature and pressure under which meters have to work. An ordinary low-pressure meter is stamped as accurate when on the test bench it properly registers gas at 60° Fahr. and 30 in. barometer. When fixed on the district, these conditions seldom appertain. In some cases, of course, changes in both temperature and pressure neutralize each other, and the meter thereby remains accurate; but when, as is more usual, the temperature of the gas falls to about 40° Fahr. all the year round with a varying baro meter, it is easy for the meter to be as much as 4 p.ct. slow.

Apart from the obvious necessity of high-pressure meters being fitted with correcting mechanism, it would appear that gas suppliers would find it pay to fit correcting devices on all low-pressure meters of at least above a certain size, to avoid loss in registration through this cause, without waiting for legislation, which sooner or later should act in this and in several other matters in connection with gas measurement under present-day conditions. Such a device, however, suitable for correcting meter registration to standard temperature and pressure conditions from conditions prevailing on the district, and to be met with on all ordinary low-pressure supplies, has not yet been attempted in practice, but should not be difficult of successful application. It could be made of standard dimensions to suit all sizes of meters, whether wet or dry, and presents no apparent difficulty in its design.

Standardization in the manufacture of any correctly-designed apparatus is what is required; and it must not add excessively to the first cost of the meter. To illustrate my point, assume the average barometrical reading throughout the year in any certain district of supply to be 29·5 in., and the average temperature of the gas measured on a consumer's premises to be 40° Fahr. (this latter figure, I may mention, is not a mere guess, but one arrived at from actual observation), the variation from the stardard conditions will then be approximately 4 p.ct. in favour of the consumer, due to low temperature, and 1·65 p.ct. in favour of the supplier, due to low barometer, or a total of 2·35 p.ct. against the supplier. On fairly large meters, registering (say) 1,000,000 c.ft. per annum, an extra 2 p.ct. would mean 20,000 c.ft. per annum, which, at the present time and under the conditions I have mentioned, is really made a free gift of to the consumer, and if, recovered, would soon pay for the extra cost of the necessary correcting device in the index of the meter. I am not advocating the fitting of such an apparatus to small meters, as it would probably be not worth while; but on cylindrical meters, with comparatively large annual registration, it certainly appears to be a paying proposition. Works station meters should be fitted in this way where temperature conditions are possibly widely different from the district conditions; and the joint effect would be to reduce the unaccounted-for gas figure.

Differences in registration due to the above-mentioned causes would, of course, vary in different districts. With a higher average barometer, the difference would be still greater in favour of the consumer with a meter not fitted with the device, and *vice versâ*. In any case, the present Act provides for no such variations from standard conditions; and, strictly speaking, a meter should not be a legal instrument if it does not register and correct to standard conditions. The present times are not favourable to the necessary experimental work in this direction being completed; but when normal conditions return, I hope we can look for certain developments along the lines suggested.

The application of the principle is possible to other apparatus besides meters. I have in mind particularly the case of recording calorimeters, which have already been brought to a high state of perfection, but which are deficient in certain respects, as complete correction in the volume of gas passed to the burner for absolute pressure and temperature is not effected; and the reading of the instrument requires correction accordingly. An instrument of the standard type, fitted with a controlling device allowing a constant weight of gas, independent of atmospheric conditions, to pass to the burner, would be of very great value to engineers, and I believe is quite possible of construction when time allows of more experimental work in mechanical details being carried out.

Education of Gas-Fitters' Youths.

For a number of years past the department with which I am connected has made a practice of holding, in conjunction with the Municipal Technical School, a series of evening classes for the benefit of our gas-fitters' apprentices; and these classes are being continued at the present time in spite of difficulties, as it is found to be of such great value not only to the youths themselves, who are thereby better fitted for their future life, but also to the department in having the services of men who have been through their own training schools in their earlier years. These classes are made compulsory for all youths of 14 and upwards until they are out of their time. It is a matter for regret that the continuation classes for the older men have had for the time being to be dropped, owing to the fact that the comparatively few men left with us are necessarily so busy and kept at work so late.

The youths are divided into sections governed chiefly by their age or their length of service, and commence with elementary work and gradually pass up to more advanced. Instruction is given in actual practical work, joint blowing, pipe bending, meter fixing, &c., in our own workshops; while lecture classes and drawing classes are held in the Technical School. It is also found of great advantage to give instruction in English writing and composition, and arithmetic; and the latter classes are of a very practical and useful nature. The boys are taught to write and spell correctly, and to compose ordinary business letters or reports, and also have instruction in most useful workshop arithmetic. Examinations are held at the close of the session, which lasts throughout the winter, and in general show most gratifying results. There is a very high standard of ability brought out and encouraged by the classes, as shown by the really excellent samples of work done by all the classes during each session.

The classes are arranged so that each boy does not have more than two attendances per week; and he attends the four classes by going to two on alternate weeks. It is not felt desirable to make a greater number of attendances than this compulsory. The classes commence at six o'clock each evening, and last an hour and a half; so that the boys are not kept undesirably late after their day's work. By means of a card system, on which the marks obtained for home work and examination results are entered, a record is kept of each boy's educational history, which has a bearing on his promotion and progress in the department. Certificates and prizes are awarded to the best students at the close of each session.

Constitution of Town Gas.

The report on the work of the Committee appointed by the Institute of Gas Engineers to inquire into the matter of the consti-

tution of town gas is awaited with interest by all engaged in the industry. The question is one of very great difficulty, and, owing to the complex considerations involved, it is unlikely that any one standard quality of gas for the whole country can be with fairness recommended. The conditions of working and supply, and the nature of the demands, vary so considerably with different districts that a very broad basis will be found necessary in order to meet the requirements of gas for industrial purposes as distinct from domestic use. The question is one that affects all gas engineers very closely; and if I might be allowed to suggest it, it would perhaps be found of advantage if the Committee were to issue preliminary reports at intervals on the nature of their findings and recommendations up to date, in order to give engineers an opportunity of assisting with their advice or remarks before the final conclusions and recommendations are arrived at, as possibly there are many points of difficulty in which the gas engineers of the country would be able, and only too willing, to assist from the point of view of the practical considerations to be taken into account in the manufacture of gas, and also the practical difficulties and considerations in distributing it over large districts.

The distributing engineer as well as the manufacturing engineer is going to be affected by the composition of the gas ultimately adopted, as the specific gravity of the gas manufactured has an important bearing on his district pressures. Speaking in general terms, the better the quality of coal gas the lower is its specific gravity, and therefore less pressure is lost in distribution. In other words, with gas of low specific gravity pressures in outlying districts can be maintained with a smaller loss of pressure due to pipe friction. Consequently, in growing districts existing mains will be able to meet the demands made upon them for a longer period before requiring enlargement than they would if gas of a high specific gravity were distributed. On the other hand, gas of a lower quality, nearer to the composition of water gas, with its calorific value of about 300 B.Th.U. and low percentage of inerts, possesses advantages to both consumer and supplier in point of cost; and where high-flame temperatures are necessary, this gas produces results equal to, if not better than, gas of higher calorific value with proper design of burner and methods of using.

To arrive at the composition of gas best suited to both manufacturing and domestic consumers in any particular district, from the two points of quality and cost, and to get a satisfactory combination will require most careful consideration. Gas has gained an immense impetus in popular favour by the recognition of its many advantages as a fuel during the present war; and it is up to our industry to see to it that these advantages are not lost when normal conditions are resumed, and more severe competition is met from other sources. The war has been the means of bringing about a wider and more general recognition of the adaptability and general usefulness of gaseous fuel than could have been secured during many years of peace. Its development has been forced in the same way as development and inventive genius have been forced in the mechanical engineering world; and retrogression is now impossible if only we see to it that the very best in value, service, and advice is available to the public after the declaration of peace. I say the very best in value and service because, after the war, it is essential that, if gas undertakings are to retain their large consumers, prices must be brought back to a basis to successfully compete with producer plants, which it cannot be denied offer peculiar advantages to large works.

Very great improvements have been made in the construction and working of these plants. Whereas a few years ago their use was almost entirely limited to the production of gas for power purposes, and that at a high percentage in the cost of working due to depreciation, their use is now adaptable for all purposes where gas is required on a large works; and the constructional improvements referred to have very considerably reduced depreciation. The composition and cost of gas to be supplied by gas undertakings is a vital factor in the decision of such firms as to whether they shall continue to use town gas or instal their own plants. The calorific value of the gas produced by such plants is low; but the percentage of inerts is also low. After all, flame temperature depends upon the percentage of inerts; and excellent results can be obtained in properly designed furnaces and burners with such gas, and are being obtained on a large scale at the present time.

The importance of the whole question of gas composition cannot therefore be overestimated, the complex difficulties and considerations involved are manifold, and the decisions ultimately arrived at will vitally affect the prosperity of the industry. In this connection, the programme of research work before the Fuel Research Board, of which notices have appeared in the Press during the past few days, possesses special interest, indicating, as it does, the vast fields of research that are open, and dealing with the very first principles of the carbonization of coal. The work of the Fuel Research Board and the Gas Investigation Committee are really intimately associated; and before one can arrive at any final conclusions the work of the other must be taken into account. Some considerable time must necessarily elapse before we can expect any definite reports from the Fuel Research Board; but a good deal of work has already been done on the lines mapped out and included in their programme by independent investigators in the gas industry. For instance, the Birmingham Gas Department Research Laboratories, to which I have already referred, have done a lot of valuable work in their laboratories and foundry in connection with metal melting and heat treatments by gaseous fuel, which results might be of assistance to the Board.

The whole industry will appreciate the generous offer of Mr. Charles Carpenter, D.Sc., of the South Metropolitan Gas Company, who has placed a piece of land at the East Greenwich Gas-Works at the disposal of the Board for the erection of a Research Station.

In spite of present war conditions, we cannot help feeling that the prospects for the industry were never so bright as they are at present. We have gained the confidence of the general public to a degree never before attained. Gas has shown its value and usefulness to an extent unhoped for a few years ago. In the manufacturing world, gas is indispensable for all forms of heat treatment in works; on the domestic side, its ever-increasing use for lighting, cooking, heating, and hot water supply is most satisfactory; and it only remains for us, as servants of the public, by our best services, to retain our position unassailed. We can look forward to the time when gas undertakings will be stations for the supply of power in all forms, for heating, lighting, and the generation of electricity, and the supply of fuel for motor vehicles, whether in the form of gas, benzol, or naphthalene. In this way lies the best utilization and conservation of our coal supply.

Mr. Poulson remarked that the address had been a very instructive one, and had covered a great deal of ground. With regard to the question of gas for motors, it seemed that the gas industry was coming into the breach in the matter of petrol shortage, as it had done in that of benzol recovery for the manufacture of munitions. In this connection, he might quote a case affecting his own undertaking. For a firm who had been using something like 150 gallons of petrol per day for the testing of aeroplane engines, they had just put in a 6-in. gas supply, and expected to see an additional demand for about 15 million c.ft. per annum from this consumer alone. He proposed a very hearty vote of thanks to Mr. Marsh for his address.

Mr. T. F. E. Rhead (Birmingham) seconded, and said that personally he had been particularly interested in the references to Fuel Research. It seemed to him the war had shown people that gas was really one of the backbone industries of the country. The national greatness of this country depended upon the coal supply; and the proper utilization of this concerned the gas industry to a very large extent indeed. The Fuel Research Board would have an extensive field for investigation; and there would be a danger that results might be expected too soon. He did not himself anticipate that much would be seen for several years to come. The work required very carefully going about; and they wanted for it good men, who knew their industries through and through, and who possessed high technical training as well.

Mr. C. M. Walter (Birmingham), alluding to the use of coal gas for motor vehicles, said most of them would agree that the present style of gas-container employed was most unsightly; but he thought the real reason why they had to put up with these things was because the question of the use of coal gas for motors had been thrust upon them in such a way that they had not had time to sufficiently consider other devices. He hoped that Mr. Marsh's suggestions with regard to the future would materialize, and that in place of the present bags they would have some neat steel containers, which seemed to be quite within the bounds of possibility.

Mr. R. J. Rogers (Birmingham) said he had for many years been very closely associated with Mr. Marsh in connection with the business of the Birmingham Corporation Gas Department; and he had been pleased to hear him deliver so good an address. Coal gas for motors was an important topic now; and in this connection his attention had been drawn to some adverse criticism which had been levelled against the Birmingham Gas Department for not taking more active steps to push on the utilization of gas for this purpose. Birmingham, it was truly said—the centre of the motor industry in the Midlands—were not taking up the matter as they should do, in order to conserve the national supplies of petrol. The fact was that few people outside those actually engaged in the business of the Gas Department realized the enormous demands for gas that were being made upon the undertaking during the war. It was quite impossible under existing conditions and difficulties to obtain the necessary materials and labour to cope with these supplies. The members would understand the difficulty that Birmingham was in when he told them that last week the increased output over the corresponding period of the previous year was 44 million c.ft.—as much gas in itself as would be used by quite a fair-sized township. To put up gas-works of this size in a week—and that was practically what it amounted to—was impossible; and those people who criticized the Birmingham Gas Department in this matter could have little knowledge of the real facts. The department were anxious to do all they could to assist the gas-driven vehicle movement, but a time arrived when it was impossible to do more, and this was the position they were in to-day. They had "shown willing," inasmuch as they had provided three filling stations for the motor vehicles. The scheme was that in the first place vehicles should be taken to the Windsor Street works, where the gas used for filling would be measured. The bags would then have stencilled on them their capacity, and after this the department proposed to supply them for the time being from stand-pipes in the street without any further metering. Mr. Marsh's remarks on the subject of gas measurement had much interested him; and he was sorry he had not dealt more fully with the question of the construction generally of gas-meters. There was no doubt that this was a subject which would have to be tackled, and tackled very quickly after the war. The whole question of the registration of gas required thorough revision, both with regard to the conditions of its sale and to the meter itself. Those of them who were connected with the selling of gas were eagerly looking forward to further reports by the Gas-Meter Research Committee.

Mr. G. M. Lewis (Birmingham) said he thought those of them who were on the distribution side of the undertaking ought to show their great appreciation of the efforts of the engineers and chemical staffs in the very difficult times they were just now passing through. The huge consumptions at present being experienced could not be met without a terrible amount of anxiety at the works. Being mainly concerned with

the domestic supply of gas, he viewed with some alarm the retrogade movement which the different departments were obliged to take at the present time. About five years ago—in what now seemed to be "the old days"—they were in the habit of looking upon the domestic utilization of gas as the side which must perhaps be chiefly encouraged, to keep up the dayload. Though they could not give so much attention to it now, he felt that after the war they would require the domestic consumption quite as much as, if not more than, they did then.

Mr. Marsh, returning thanks for the vote, remarked that the address was not quite what he should have liked it to be; but it had been prepared under great difficulties. He wished to endorse what Mr. Lewis had said with regard to their appreciation of the work of the engineering staff. It was to them that he would have to look for the successful overcoming of the troubles to be encountered during the next few months.

The meeting concluded with an announcement by the Hon. Secretary that the session had begun well, with the addition of nine new members to the roll.

Programme for the Session.

The fixtures for the present session are: Nov. 15, a paper by Mr. V. E. Green, of the Industrial Research Laboratory, Birmingham, on "Quick-Revolution Gas-Engines." Dec. 8, a visit to the Austin Motor Company, Ltd., Northfield. Jan. 10, 1918, a paper by Mr. C. F. W. Rendle, of Redditch, and a debate. Feb. 14, a paper by Mr. E. Cooke, Accountant to the Birmingham Gas Department, on the "Application of Office Machinery to Modern Office Problems." March 14, a paper by Mr. E. W. Smith, Chief Chemist to the Birmingham Gas Department, and the annual general meeting.

WAR CONDITIONS AND THE SELLING PRICE OF GAS.

By Norton H. Humphrys.

It is surprising that the successful and unostentatious manner in which the selling price of gas throughout the country has been controlled by a Government department over the last half century, to the great advantage of the consumer, has not received more attention in connection with the cumbersome control operations over other commodities that have been introduced under Government auspices within the last three years. Many of them are of doubtful efficacy, and none can be claimed as a conspicuous success. Presumably established for the relief of the purchaser, in respect to monopolies rendered possible or originated by unprecedented war conditions, some of them have proved in practice to be more effectual in fixing a minimum than a maximum price, and they have aggravated the hardships that they are supposed to ameliorate.

Among the reasons that have led to the successful control of the price of gas, and almost the opposite effect in regard to other important commodities and necessaries of life, are the fact that in the first case the guiding recommendations emanated from independent committees, not specially qualified or interested in the gas industry, but capable of hearing and judging on evidence offered by the interested parties, which in all cases included a fair representation on behalf of the purchaser. The assumption that a Price Control Committee must be wholly or in great part composed of parties interested in the trades concerned, and that no others are sufficiently enlightened or qualified to deal with the question, is a modern invention that so far has not proved advantageous to anybody outside the interested trades. Another is the fact that the Committee recommendations that eventually passed into law were to a great extent based on mutual concession and agreement, and at any rate were loyally accepted as a settlement by all parties concerned. Gas companies did not combine with a view of evading, nullifying, or driving a coach and four through the regulations, as so many of the trades affected by Government control are doing to-day.

Not only have the gas undertakings received little assistance in respect to unrestricted advances in the prices of coal and all other materials, but their difficulties are aggravated by onerous restrictions on the sales of tar and sulphate of ammonia that practically corner the markets, and represent losses of 20 to 25 p.ct. on the returns received for the residuals. Tar must not be sold to others than distillers; and the result is that, notwithstanding the increased demand, prices are no better than when it was represented to be a drug on the market. Sulphate of ammonia costs quite £4 per ton more on its manufacture in 1917 than in 1914; and the restricted sales have so reduced the market prices that the net profit per ton has greatly suffered. The general effect of increased demand is improved prices; and there is no reason why tar and sulphate should prove the exception, apart from the restrictions above instanced. Gas companies do not seek to profit unduly by the position, as so many traders are doing; but there is no reason why they should be subsidized for the benefit of tar distillers, whose products are not subjected to similar imposition, or the agricultural interests, who are receiving large advances in prices of cereals, &c. A ton of sulphate, properly applied, will increase the crops as much in 1917 as in 1914; and therefore the intrinsic value of the material has increased to a corresponding extent.

The enormous depreciation in the value of gas securities is a misfortune for which no one can be held responsible, except possibly the Kaiser of Germany. But it must be appreciated and set in its proper place as one of the war conditions that we are now considering, and assessed at its appropriate value in connection with gas-works finance. Referring to the "Stock Market Report" given in the "Journal" for the 2nd inst. (p. 41), I find a list of about 90 leading securities, in respect to which business during the week appears to have been confined to 21. Leaving out of consideration the foreign securities as likely to be affected by conditions other than national, a list of representative home investments has been prepared, in illustration of the extent of depreciation that has obtained, since July, 1914. The average over the whole is 23 p.ct. The depreciation of currency values must also be recognized. The result is to show that property purchased in July, 1914, for £1000 might to-day realize £600 to £800 cash—say, £700—which is equivalent to about £400 at the date of purchase. The loss on realization is not less than half, and may be two-thirds; and the misfortune to those who are compelled to sell-out is obvious, as they are just the holders who can least afford to lose money.

Market Quotations. July 30, 1914.	Oct. 2, 1917.	Depreciation.	Ditto, Per Cent.
79	62	17	21½
15½	11	4½	29½
213	150	63	34
108	72	36	33½
125	100	25	20
102	71	31	30
89	53	36	40
154	97	57	37
121	87	34	28
99½	72	27½	27½
15	10½	4½	30
131	88	43	33
224	184	40	18
159	139	20	12½
116	77	39	33⅓
102	77	25	25
117	71	46	41
156	117	39	25
2126	1638½	587½	Average 23

The currency depression also has its effect on the revenue account, in connection with balances of accumulated profits or reserves that are directly or indirectly available for working capital, repairs, and contingencies. A credit to such funds, amounting to £1000 in July, 1914, is now worth, perhaps, £600. During the last three years, many necessary repairs have been staved-off, partly with a view of bolstering-up the balance available for dividends, and partly on account of the difficulty or actual impossibility of getting the work carried out. But the fact that it cannot be done now, in no sense disposes of the responsibility for doing it as soon as circumstances will admit. The end of the war is not yet in sight, and the advent of this desirable event will find many gas undertakings with insufficient reserve funds, together with a heavy accumulation of repairs and renewals. One can scarcely suppose that the return in the direction of pre-war commercial and financial conditions will be rapid; and the difficulties connected with bringing the plant up to the usual standard will be onerous, to say nothing about badly-needed extensions and improvements.

So far as circumstances will permit, it is only ordinary prudence to directly or indirectly provide means for retaining in visible form the sums that, under normal environment, would have been expended under these items. In any case, they should not be considered as applicable for division as profit. Such a course is equivalent to a distribution of profits in excess of the actual earnings. Probably an amount that would in ordinary times be called a large reserve will scarcely meet the requirements, and the aid of the reserve fund towards paying a reasonable dividend will be indispensable for some years. Extensions will have to be postponed for lack of capital, or the difficulty of raising it. The custom of issuing new capital at a lower rate of dividend than the original will be reversed, as the circumstances above instanced will not commend gas securities to investors, in competition with more promising investments which will be prominently in evidence.

The necessity for running larger stocks of materials of all kinds, in view of irregularity as to supply, together with the increased costs, has had the effect of increasing the amount locked-up in this direction quite two-fold, as may be seen by comparing current stocks with those on hand (say) five years ago. Many gas undertakings have been accustomed to provide working capital out of accumulated funds, to a large extent, and the increased value standing to the credit of "stocks on hand" will represent a serious encroachment on funds that are required for other purposes.

All these matters are concerned in, and have their influence on, the selling price of gas, and there is a general tendency among directors and managers to underrate their importance by regarding them as merely of a temporary character, to leave the end of the war conditions to take care of themselves, and to assume that the only, or the chief, consideration in raising the selling price of gas is to cover the immediate deficit on profit and loss. Anything of this sort, or worse—the depletion of the reserves as a means of scraping together a dividend—is almost suicidal, as failing to maintain the status and position of the property. Unless these facts are realized and acted upon, the set-back in the value of gas property, and on the progress and well-being of the industry at large, will acquire a permanent character.

The directors of gas undertakings are unique as being the only traders who are reluctant to raise prices, or who apologise to their

customers for a twopenny rise. As a rule, the seller is only too glad of an excuse for such a course, and is in no need of the cautions above set forth. Compare the attitude of gas companies with the 50 p.ct. rise on passenger railway traffic. Did the railway companies consider the convenience of the commercial traveller and others whose journey expenses are an important item of their business outlay? Or the large advances on rates for coal and freights, made without the slightest interest in the effects on the industries concerned? Or the truculent demands of labour, put forward without the slightest intention to relieve the extra burden by giving better value in return. Imitation of this marked alacrity in the lifting of prices is not recommended, or anything in the direction of what is now called "profiteering," but was formerly known by a less polite term. But gas undertakings should follow to the extent of discarding precedent, and fixing such prices as will enable them to maintain the integrity of their undertaking under present and immediate future conditions. The selling price should cover working expenses, a dividend sufficient to preserve the character of gas securities in the eyes of prospective investors, and an adequate equivalent for repairs and renewals, whether completed or postponed. A narrower basis amounts to starvation of the concern, and the laying-up of trouble for the future.

HEAT INSULATION AND WATER-HEATING.

American electricians have, says "Gas Age," been giving attention to the insulating value of various materials, as a means of meeting the disadvantage experienced when trying to introduce electricity for domestic water-heating, by reason of its cost. They claim that a unit of electricity will furnish 8 gallons of "hot" water, and point out the desirability of efficiently lagging the boiler, to prevent or minimize the loss of heat by radiation and convection. In view of the increasing cost of all classes of fuel, these considerations apply in a general sense, and include town gas apparatus.

A large number of laboratory experiments were conducted, by covering domestic water-heaters with a layer of the insulating material an inch thick; and the following figures show the radiation per square foot of surface, per degree Fahrenheit difference between the interior and external surfaces, as recorded by various observers:

Material Used.	(1)	(2)	(3)
Dead air	0·191	—	—
Asbestos sponge	0·330	—	—
Cattle hair felt	0·345	0·251	0·320
Magnesia blocks (85·7 p.ct.)	0·455	0·331	—
Mineral wool	0·479	—	0·38 to 0·47
Diatomaceous earth and asbestos	0·526	—	—
Pure loose asbestos fibre	0·546	—	—
Asbestos corrugated sheet	0·693	—	—
Virgin cork sheet	—	0·274	0 47
Lith	—	0·305	—

Other researches indicated that the saving of heat by insulation might range from 68 to 83 p.ct. An important point is that the efficiency increases with the temperature. One observer found that an 80 p.ct. magnesia, which had an efficiency of 82 p.ct. at 100° Fahr., gave 85 at 200°, 87 at 300°, 89 at 400°, and 91 at 500°.

Heat Treatment of Metals with Gas.

"The fact that gas has established itself firmly in the Mint is significant, because the initial difficulties incidental to the introduction of gas-firing are nowhere greater than in the case of crucible furnaces." This is a remark made by Mr. Shipley N. Brayshaw, in the October issue of "A Thousand-and-One Uses for Gas," when dealing at some length, in the course of an article on the subject of the heat treatment of metals with coal gas, with the paper Mr. W. J. Hocking read some months ago before the Institute of Metals. In this paper, it will be recalled, the author gave details of metal melting at the Royal Mint over two periods of five years each—in one case with coke, and in the other with coal gas. Mr. Brayshaw quotes some of the results arrived at, which were given on p. 598 of the "Journal" for March 27 last. He then goes on to point out some of the purposes other than metal melting to which the burner used at the Mint has been put. It is regularly employed for heating platinum strongly; and on one occasion a large platinum ingot weighing upwards of 500 oz. was heated by it for a longer time than usual, and was then found to be dripping at the corners. The interest of this, it is remarked, lies in the fact that the melting-point of platinum is about 1750° C. The use of gas has been extending rapidly in many directions during the last few years, and Mr. Brayshaw believes there will yet be great developments which will dwarf the work of the past, and perhaps make the results at the Mint look not so much like a final achievement as a step on the way to a new stage in the commercial use of gas. A brief outline is then given of some high-temperature developments in the application of gas. This development, which is already in progress, can, Mr. Brayshaw maintains, "hardly fail to spread much more rapidly in the future, because the use of low-pressure air and gas for practically all temperatures and processes has cheapened the cost of the plant and upkeep, and at the same time has simplified the working of the furnaces and produced better work."

TO PROMOTE GAS LIGHTING.

While seeking to develop the uses of gas for fuel and industrial purposes, American gas engineers are not overlooking the importance of retaining lighting business. Free maintenance and the inspection of appliances is becoming a general thing. But the Illuminating Committee of the National Commercial Gas Association, recognizing the need for further effort than the publication of books and pamphlets, have initiated a scheme for securing the interest of fixture manufacturers and enthusiasm among gas salesmen. They are preparing booklets, suited to modern conditions, for distribution, and have held a meeting in New York, to which all makers of fittings or glassware were invited.

The wide field for a high or superior class of lighting fixtures was set forth, and the point illustrated by descriptions of typical modern installations. They offered to act as a Committee of Inspection of all gas-fixtures made by members of the Manufacturers' Section of the Association, who would be requested to submit samples, which would be carefully examined, in view of standard requirements in construction and efficient lighting, with the object of placing them on a certified list for publication. This list would include full details, the makers' name, a certificate of approval, and a recommendation urging gas companies to stock and promote sales. By this means, it was hoped to develop manufacture along the best lines, to keep the gas industry fully in touch with all novelties, and to secure co-operation in the displacement of all antiquated, cheap, inefficient, and unsatisfactory fixtures. Firms co-operating in this scheme would have the benefit of national advertising under the auspices of the Association.

Each maker, it was suggested, should send in four articles, of which two would be selected for publication, in connection with special efforts to be made by gas undertakings in the form of a "Gas Lighting Week." A meeting of gas companies was to be held for outlining general plans for a campaign on these lines, at which all the approved fixtures would be on view and in full operation.

Checking Fillings of Motor-Car Gas-Containers.

At the recent meeting of the Midland Association of Gas Engineers and Managers, Mr. W. Chaney, in the course of the discussion on the use of gas for motor vehicles, said Birmingham had four filling stations; and it was rather difficult to keep a check on the number of fillings of the bags. Mr. Sydney R. Barrett, the Fittings Superintendent to the Birmingham Corporation Gas Department, had, however, devised a cheap and useful means to do this. In reply to an inquiry, Mr. Barrett says that what has been adopted for the purpose is a simple clock register pressure gauge, which is connected on the outlet side of the valve on the service through which the balloon is filled. The pressure necessary to lift the bag is about 3-10ths; so that whenever the valve connecting the mains with the bag is opened, the indicating pen rises 3-10ths on the pressure-sheet of the automatic register. The length of time that the valve is kept open is also registered by the clock on the register. When the valve is turned off, the pen drops to zero, and so on. By this means they are in a position to count the number of fillings during the day, and the length of time that the valve has been kept open on each occasion. At present it is not proposed to supply gas in Birmingham for motor-cars through large meters in the street, but direct from the gas-main, charging fixed prices per fill of the bag, of which the capacity is measured at a central station provided with a meter for the purpose. The capacity of the bag is then stencilled on it; and this is accepted for all future fillings.

A New High-Grade Fertilizer.—The Imperial Trade Correspondent at Toronto (Mr. F. W. Field) reports, says the "Board of Trade Journal," that an American firm established in Ontario expected to begin producing a new high-grade fertilizer—ammonium phosphate—in August, when the plant for the purpose was to be completed. At a second plant owned by this concern the manufacture of a low-grade cyanide from cyanamide was undertaken during 1916-17.

The Refractory Materials Section.—On the occasion of the recent Glasgow meeting of the Refractory Materials Section of the Ceramic Society, the Council appointed two Sub-Committees (with power to co-opt additional members), to prepare reports respectively on: (1) Standardization of Methods of Testing; and (2) Refractories for Spelter Furnaces. It is anticipated that the former will be ready for the spring meeting in Sheffield, and the latter for the subsequent autumn meeting at Cardiff.

Scottish Junior Gas Association (Western District).—At the opening meeting of the session (to be held in the Royal Technical College, Glasgow) next Saturday, Mr. Alex. Wright, of Lockerbie, will deliver his Presidential Address. On Nov. 10, there will be a visit to the Paisley Gas-Works; and on Dec. 15, a paper by Mr. J. Beveridge, of Airdrie, entitled "Notes on High-Pressure Distribution." The fixtures for the remainder of the session are: Jan. 26, 1918, a visit to the Dalmarnock (Glasgow) Gas-Works. Feb. 23, a paper on "Faults of Ordinary Meters," by Mr. A. H. Whitelaw, of Glasgow. March 16, a joint visit with the Eastern District Association to the Alloa Gas-Works. April 7, the annual meeting, with a lecture by Mr. Alexander Yuill, of Dundee.

SOCIETY OF BRITISH GAS INDUSTRIES.

The Autumn General Meeting of the Society was held last Thursday, at the Trocadero Restaurant, Piccadilly Circus, W. Mr. P. F. HOLMES, J.P., the Chairman of the Council, presided, and was supported by most of the members of the Council.

The CHAIRMAN announced that he had hoped that either Sir Dugald Clerk or Prof. Arthur Smithells would have been present to take the chair, in view of the fact that their President, Sir Robert Hadfield, Bart., was absent owing to illness.

The SECRETARY (Mr. Arthur L. Griffith) read a letter from the President in which he said that, owing to overwork, he was not up to the mark; and his doctor had prohibited him from public duties just now. He also expressed the hope that the meeting would be a very successful one.

HALF-YEARLY REVIEW.

The CHAIRMAN said: It is not my intention, at this, our half-yearly meeting, to go very deeply into the work that has been done by the Society during the last six months, but rather to touch briefly on the main points, so that your memories may be refreshed regarding what has been, and is being, done.

CONGRATULATIONS.

In the first place, it is my pleasing duty to offer the heartiest congratulations of the Society to our President, Sir Robert Hadfield, to Sir Dugald Clerk, and to Sir W. H. Cowan, M.P., Director of Messrs. Parkinson and W. & B. Cowan, Ltd., on the well-merited honours that have recently been conferred upon them. In honouring these gentlemen, we feel that His Majesty is also honouring the Society and the industries which it represents.

IMPORTANT SUBJECTS CONSIDERED.

Several important items have been, and are still being, dealt with by your Council, the most important of which are:

Increases of wages in the engineering trade.
Registration of Business Names Act.
Conservation of fuel resources.
Refractory materials research.
British Engineers' Association.
Gas-meter research.

Dealing with these in order, we have:

Increases of Wages in the Engineering Trade.—In view of the sudden and large increases in wages that were being granted by the Committee on Production, Mr. R. J. Milbourne suggested that a clause ought to be inserted in all quotations submitted, so that any increases in wages which might become necessary after a contract had been taken could legally and reasonably be charged as an extra. This matter was discussed very fully in Council; and, as a result of their deliberations, a special clause was drafted and sent out to all members. It is hoped that this suggestion has proved helpful, particularly in view of the recent special increase of wages that has been awarded by the Minister of Munitions to skilled engineers and moulders.

Registration of Business Names.—Your Council felt very strongly that this Act should be extended so as to include Companies, as it was found that many firms of enemy origin were turning their businesses into limited companies so as to evade the Act. Representations were made to the Board of Trade; and members throughout the country were asked to use their influence with their local Members of Parliament. As a result of these representations, a new Act to include limited companies has been placed on the Statute Book.

Conservation of Fuel Resources.—In connection with the Government reconstruction scheme after the war, this all-important question of fuel resources has occupied the attention of the Council of the Society in conjunction with the National Gas Council; Mr. Main and myself acting as your representatives on the Committee.

Several meetings have been held from time to time; and, as a result, your Council have framed certain suggestions which are at present in the hands of a Sub-Committee of the National Gas Council for consideration, along with other proposals from different interested sections. It is interesting to refer here to a paragraph which appeared recently in the Daily Press, and also in this week's "GAS JOURNAL," in which it was stated that the Fuel Research Board had decided to erect a Research Station, where operations could be carried out on an industrial scale. This, I think, everyone here present will agree is a step in the right direction.

Materials and Labour.—In addition to the question of fuel conservation, two other very important subjects are being dealt with—viz., the rationing of materials, and the dilution of labour. As both these questions are very serious ones, and are likely to become more serious in the future, they will be carefully watched, and the interests of members will be safeguarded as far as is compatible with the needs of the various arms of the Service.

Refractory Materials Research.—Important movements are in progress in connection with this matter, in which Sir Robert Hadfield (our President) and Mr. Albert Cliff (the Chairman of the Fire-Clay Section) are taking a very active interest.

British Engineers' Association.—This Association asked our Society to nominate a representative on their Council; and, as several of our members are also members of that body, and it seemed desirable that we should keep in touch with it, your Council have nominated Mr. George Clark, of the Bryan Donkin Company, Ltd., to represent them.

Gas-Meter Research.—In connection with the research into the life of meters, the subject had been dealt with by the General Committee of the Meter Section with a Committee of the Institution of Gas Engineers. They are at present dealing with the question of guarantee.

GOLF COMPETITION.

The Council felt that it would be in accordance with the wishes of the members if the Annual Golf Competition was postponed this year; and they therefore made arrangements accordingly.

THE WAR AND THE INDUSTRY.

We have now entered the fourth year of war; and our determination to win has not abated one jot—in fact, the dastardly actions of the enemy have only served to increase that determination, if such were possible. The work that has been done by the gas industry has merited the appreciation of the Ministry controlling their efforts. It is admitted on all hands that the gas industry has passed through some trying times, and will undoubtedly pass through even more trying times; but we shall face them with the same spirit as our boys are facing the enemy, so that the fruits of victory may be fully enjoyed by all when they return to their native land. In conclusion, let me suggest that, as we are at present, all part of the greatest military organization the world has ever seen, we adopt as our watchwords the well-known military phrase: "Carry on."

Mr. SAML. CUTLER, JUN., Assoc.M.Inst.C.E., then read a paper entitled:

TRADE AND THE CHANNEL TUNNEL AND AIRSHIPS.

[Extracts from the Paper.]

In responding to the Chairman's request to contribute a paper at to-day's meeting, I must confess to some difficulty in selecting a subject which would be appropriate to the industry our Society represents, as during the long course of the war our gas-engineering establishments have perforce devoted their chief energies and resources to armaments, and thus little has developed in the sphere of gas engineering to form the subject of a paper before the Society. Nevertheless the work which our industry has accomplished during hostilities will, I venture to think, rank well with that of any other section of the engineering world, and show by its records how materially both gas undertakings and gas engineering firms have contributed to the sinews of war required for the great struggle—unhappily not yet ended.

CHANGED VIEWS AND MATERIAL REASONS.

Although it cannot be claimed there is much that is new to state concerning the Channel Tunnel, recent events have shown the national importance of facilitating the intercourse between European nations; and, from our position on the map, both the Channel Tunnel and airship potentialities will become important matters after the present conflict is finished.

It may be said without fear of contradiction that the general consensus of opinion in pre-war days was decidedly antagonistic to the construction of a Channel Tunnel; and this continued well into the course of the present war, when the submarine type of battleship unexpectedly proved its value. The few notes to be read to-day will suggest the desirability of reconsidering with some care the question of a Channel Tunnel from the point of view of future developments, both military and commercial, because we must now consider the fact that the submarine will play a formidable part in future sea-warfare—thus ships sailing visibly on the surface will be rendered a hundred times more unsafe than they hitherto have been.

We can hardly conceive, however, that it is at all likely we shall be called upon to take part in another European conflict for many years to come, always on the assumption that victory is ours, so that its attendant terms of peace shall comprise the important inclusion that the provinces of Alsace and Lorraine be returned to France; for without the mineral wealth of this territory Germany would have been defeated, and the war terminated long before now. Should, however, Germany in course of time be in a position to again take up arms, it will doubtless be in the first instance to endeavour to regain possession of these valuable districts, because to my mind Lorraine is in a measure the key to power as between France and Germany; and thus for our own eventual protection, apart from other circumstances, it is possible that we might be called upon once again to take up arms and assist France to defend and retain these provinces. From the mineral wealth Prussia wrung from France have developed the foundations of much of the industrial strength of modern Germany. This is substantiated by the fact that out of some 28,607,000 tons of iron ore which Germany in 1913 extracted from her soil, 21,135,000 tons came from Lorraine. The temporary occupation of territory by the enemy during 1915 to 1917 emphasizes even more the valuable additional means that have further enabled Germany to create and maintain her vast supply

of munitions of war. It therefore becomes almost a necessity in the future for political reasons alone to take advantage of an available means of direct undersea communication with the Continent as an alternative to surface ships.

The Tunnel Proposed.

Description as to past work and present plans connected with the tunnel followed in the paper. From it we learn that the idea of the tunnel is at least a hundred years old and possibly much more. But it was not until 1874 that a practical scheme was undertaken, when a gallery was driven by the French on their side of the Channel for a mile-and-a-half beneath the sea. Since then the scheme has been occasionally revived in various ways—the latest works resulting in galleries penetrating for a distance of some 2026 yards from Dover and 2000 yards from the French coast carried out in 1882. An interesting feature to note in connection with the tunnel (or rather twin tunnels) is the comparative shallowness of the sea; being but 165 ft. deep at mid-channel, and only 90 ft. deep at the three-mile limit. The length of the tunnel would be about 24 miles immediately under water, but with the approaches on both sides would total to about 32 miles of railway tunnelling. The traffic would be electrically operated; and thus ventilation presents no great difficulties. The cost of the tunnel is estimated to amount to some 16 million pounds sterling; and in the light of recent events, one can venture to say that, provided parliamentary sanction was given to-morrow, the sum would be immediately forthcoming.

Regarding the probable traffic, at the normal rate of annual increase, the number of travellers crossing the Channel by all routes in 1925, when it is suggested the tunnel might be open for use, would be over 2 million passengers; and it is estimated that the Channel Tunnel would capture at least 65 p.ct. of this traffic, representing 1,300,000 passengers. At a fare of 10s. per head, and with 10 p.ct. added for luggage charges, a return of over £700,000 is derived. Adding thereto £40,000 for postal services and £800,000 for goods traffic, an approximate £1,500,000 will represent the receipts per annum. The cost of working is estimated to be £420,000. Thus upwards of a million pounds annual profit can be looked for on a £16,000,000 outlay.

Considerations for the Manufacturer.

It has often been said, and with this I am in agreement, that British manufacturers do not always lay themselves open to delivering the goods as the customer requires them, whereas Germany claims to have succeeded in this respect more than perhaps in other matters. Having access to every town on the Continent by rail, there is more frequent opportunity for the personal interview to take place between buyer and seller, which is worth reams of correspondence. It is curious that Englishmen, while making the best colonists in the world, have been said to be the worst commercial travellers abroad. The whole matter resolves itself into the lack of ready means and facilities to enable the commercial traveller to go abroad. We regard it as a matter of small importance to send our travellers and technical assistants to obtain particulars of an inquiry or commence negotiations for an order a few hundred miles from our works. But we hesitate sending them on the Continent; yet the major portion of industrial Western Europe would be within direct and easy reach by railway. It has been suggested that, from a political point of view, rail power rather than sea power will in future dominate Europe, in which probably lies a good deal of truth. But, in any case, for business, social, and recreative purposes a through train service to the Continent from this country will certainly be beneficial to the whole of Europe, and should put our relations with every Continental country on a different and improved reciprocal basis.

Aerial Developments.

My impression is that at an earlier date than the majority of people expect, an air service will develop side by side with rail and sea transport; but whether by giant aeroplanes or dirigible airships remains to be determined after a demonstration of the practicability under commercial conditions of the several types of large airships which no doubt will be available on the termination of the war. Consider the economy obtainable in transforming a military airship into one to be used for commercial purposes. There will be no necessity to travel at excessive altitudes beyond the range of gunfire. Thus in flights from London to the North of France, Belgium, North Germany, and Holland, 1000 ft. above sea-level would probably suffice. Assuming the density of air at sea-level to be 30 in., it would be reduced to 15 in. at a height of 15,000 ft.; and the carrying power of the airship will decrease in similar proportion. Thus a ship that weighs 15 tons unloaded, and is capable of carrying a 14-ton load at an altitude of 1000 ft., will only have a carrying capacity of 5 tons at a height of 10,000 ft., and will lose its carrying capacity altogether at 15,000 ft. In other words, for a given capacity ship you can carry 5 tons more weight at 1000 ft. than at 10,000 ft.

The author referred to the reduction of distances by travelling as the crow flies; and then gave some account of the evolution of dirigible airships in different countries. Towards the end of this section of the paper, allusion was made to the modern type of Zeppelin. Among other points, there was remark upon the fact that very few of the modern type have been destroyed through the agency of the elements. It is also evident that improvements of a far-reaching character are being effected with the object of perfecting these machines. The dimensions have increased to a diameter of 72 ft., with a length of something approaching 800 ft., accommodating 24 separate ballonets, with a total gas capacity of a million cubic feet, adding but some 3 tons to its structural weight, with an increased radius of action, and, what is more important, a lifting power to a greater altitude. A modern airship, with a volumetric capacity of a million cubic feet, is equipped with four gondolas and six engines each of 240 H.P., enabling a speed of over 60 miles per hour to be maintained.

Gas Undertakings and Airship Developments.

A word will not be out of place to consider the relations between gas undertakings and the provision of the buoyancy requisites of the airship. Though we see passive balloons sailing daily over the Metropolis mostly filled with coal gas, yet for economical and commercial purposes coal gas has no comparison whatever with hydrogen; the latter having nearly six times greater lifting power. Modern hydrogen-producing apparatus is akin to coal-gas plants, much of the apparatus being similar—indeed, an existing gas-works seems to be the most suitable and economical place for the manufacture of airship gas. Opinions differ whether the airship will develop on commercial lines; but the point can only be determined by practical experience under commercial conditions after the war. There are, however, other important directions requiring a plentiful supply of cheap hydrogen, and apart from aerial navigation may be mentioned—fat hardening, ammonia synthesis, autogenous welding, and electric lamp manufacture; and these are but some of the directions which at present require hydrogen, all of which are capable of expansion. Other uses will be added to the list—to instance only the possibility of it being used in connection with the carbonization of coal in order to improve gas-making results whenever hydrogen can be produced at a cost below that of coal gas.

These matters appear to justify the suggestion that hydrogen manufacture should be closely studied, and the plants at present used for its production improved to give an efficiency somewhat nearer the theoretical possibilities. Whatever the extent of the commercial use of hydrogen may be for filling balloons, either passive or dirigible, the maintenance of high buoyancy power is at present a very costly matter, inasmuch as after quite a brief period, owing to the rapid diffusion of the gas through the envelope, the hydrogen rapidly falls below its sustaining purity, and has to be either wholly or partially replaced with new gas of maximum purity. I am not aware of any apparatus which up to the present has been put into practical operation for the purification of hydrogen diluted with air. A certain amount of optimism in the future of airship development on commercial lines has led us to devote some attention to the matter, and to suggest a process which it is believed will prove a satisfactory solution of the difficulty.

DISCUSSION.

Mr. H. M. Thornton, in the course of his remarks, indicated that he was in favour of the Channel Tunnel. If he wanted to be convinced as to the desirability of the tunnel before the war, he was satisfied now after listening to the paper. Looking at the matter from the point of view of trade, he felt that, as a practical proposition, the airship was farther away than the railway. When they considered that London was practically the centre of the world's trading, and that to reach it from other countries it was necessary to cross the sea, what a vista of possibilities opened up when they thought that the people of the whole Continent of Europe and far beyond could reach London, if they had a Channel Tunnel, by through trains. He believed, too, that it would result in a wonderful interconnection of nations, and, by facilitating closer relationships, would help in the solution of important problems, would bring about the interchange of ideas, and would assist in the realization of a permanent peace. One matter that appealed to him perhaps more than any other was the reference towards the end of the paper to the great industry to which they belonged, and its association with the development of airships. It raised in their minds possibilities of which they had never before dreamed as to the future of the industry. If these possibilities materialized, the members of the Society as manufacturers would share in the development.

Mr. W. J. A. Butterfield, F.I.C., unlike Mr. Thornton, was inclined to view the airship with favour rather than the tunnel. The airship had the great advantage over the tunnel that it was self-contained, and could alter its route. It had, in an intensified way, the advantage that the motor has had over the tramcar—it was not confined to one route. He had been much gratified, in the course of the war, to see the way in which British constructing engineers had met the calls made upon them, especially in connection with airships and aeroplanes. The technical advances had been enormous. The Germans started out with an immense amount of accumulated knowledge of these subjects. He thought from what he knew that this country was now fully level with them; and if it did become a question of airship construction for commercial purposes in the future, he believed that construction would take place quite as much in this country as on the Continent. There were many interesting technical questions involved, some of which Mr. Cutler had touched upon; but they could hardly be discussed freely now. One very important one was the diffusion of hydrogen through the envelope. This they might hope would be arrested by improved fabrics. Another was the possibility of purifying hydrogen after it had been rendered impure by the percolation of air; and this question could be attacked with every prospect of success. Mr. Cutler had hinted at one way of dealing with it; and he (Mr. Butterfield) hoped it might prove successful. He believed there were also other ways of attacking the problem. It was a sign of the times that gas engineers should be taking an interest in a subject of such wide-reaching importance, with the knowledge that developments of at least one of the questions rested largely with them.

Mr. F. G. Cockey regarded the fact that up to the present in the discussion there had been no hostile criticism of the Channel Tunnel scheme as a sign of the change of public opinion. As a nation, they had looked upon themselves as the centre of scientific development and progress. They had perhaps carried the idea on until it was out of date; and the intercourse that had been continually increasing of late years had enabled them to see that they did not know everything—that there were many things to learn from Continental and even more distant nations. The still greater facility of communication with the Continent by means of the Channel Tunnel he felt would tend still further to enable them to realize the point of view of other nations and their relative merits as compared with our own. This would help to stimulate effort to still keep ahead of them in matters of research and invention. The question of aerial transport for commercial purposes seemed to be rather a distant one, but perhaps not so remote as they thought.

Mr. A. R. Griggs (invited by the Chairman to speak) said he could hardly enter into the paper, so far as he was concerned in the subject, in view of the fact that, being connected with the Air Department, he might say something that he ought not to say. He was, however, glad Mr. Cutler had brought the matter before the Society, because he (Mr. Griggs) believed that after the war there was going to be a large development of hydrogen manufacture, either for airship work or other purposes to which it could be applied. The whole problem of hydrogen manufacture was one that called for gas-engineering experience; but he did not think that anyone could possibly deal in one paper with all the problems involved, even though they had been making gas apparatus for many years. But he believed that those with such experience would be of great assistance in the near future, or after the war, in solving a good many problems that at present were unsolved.

Mr. W. D. Helps was strongly in favour of the Channel Tunnel; and as soon as they got it, so far as he was concerned, the better. It was clear from his remarks that airships would not have the slightest charm for him.

Mr. J. W. Scott pointed out that other societies were passing resolutions in favour of the Channel Tunnel; and he thought that one coming from this Society would carry some weight.

Mr. Cyril G. Davis considered that everybody would welcome the Channel Tunnel as a means of further developing the country's industries. Very little had been said as to the aeroplane or the biplane. In his opinion, after the war the biplane or the triplane would be a most popular means of transit for commercial men, because time was of great importance to those engaged in industry. He should imagine that it would be possible by such means to travel to Paris, Brussels, or any other Continental city or town in half the time that it would take to travel by train.

Mr. Fred. J. West said if Mr. Scott would allow his remarks to be shaped into the form of a resolution, he would be glad to second it. He suggested that the resolution should be to the effect that the main features of Mr. Cutler's paper regarding the Channel Tunnel scheme should be brought before the Government in every possible way.

Mr. R. D. Heckels said, although he was Secretary of the Channel Tunnel Company, he was not present in any official capacity. He should, however, like to thank Mr. Cutler very much for what he had done, and for the support of the members of the Society. The Channel Tunnel Company only wanted everyone's ideas or feelings upon the matter; and then it was a question for the Government to say whether or not it should be carried out, because, after all, they must first look to the security of the nation before any question of enterprise. Any resolution that was passed, he should be pleased to bring before his Directors, as well as before the Committee of the House of Commons who were dealing with the question.

Mr. Charles Clare remarked that, though opposed to the Channel Tunnel before the war, he had become a convert to it. Apart from political reasons, if the tunnel did materialize, he thought that at any rate some of their present enemies ought not to have the use of it for many—say, thirty—years to come. With the tunnel, he thought the extension of this country's commerce with the Continent would be very great. At the present time, all their exported goods had to carry freight and the risk of double handling. As to airships, he did not agree that their coming into practical use was away in the remote future. When they considered the tremendous extension that had taken place in them the last few years, they might accept it as probable that the development would be greater in the immediate future. Apart from gas, he thought that those firms who made gas-furnaces for annealing and similar kinds of gas-using appliances would find a fine outlet for their goods in aeroplane manufacture alone. They were already doing a great deal in this direction.

Mr. Cutler thanked the members for the reception they had given to his paper. He should like to thank Mr. Thornton for what he said in connection with the latter part, as to the connection between airship development and gas supply. He (Mr. Cutler), however, was like Mr. Griggs, who said that it was difficult to say much because one might say too much; and one, of course, could not in these days touch on anything which was of a technical character in connection with airship development. At the same time, he thought that gas undertakings should, in the early stages of airship development, consider what he said in his paper as to hydrogen plants. They were in their infancy; but at present there was great room for improvements. Mr. Cyril Davis rather suggested that aeroplanes would take preference of the Channel Tunnel. If he would just reflect for one moment, he would remember that the idea running through the first part of the paper was to provide a secure means of getting from England to France without exposing surface ships to submarines as they were now. The aeroplane would also be exposed to enemy aeroplanes. The Channel Tunnel was an alternative means of transport. Mr. Davis also suggested that the aeroplane would have a greater measure of success than the airship. He (Mr. Cutler) was bold enough to believe that, for commercial purposes, the aeroplane was not going to be the last word. All the present means of conveying passengers or goods, whether by road or sea, gave them the power of stopping without the risk of loss of life or destruction of goods; whereas, no matter whether they had any number of engines, there was always the liability to have to stop for adjustments or stress of weather. In relying upon the aeroplane, immediately they stopped, the machine had to come down. With the airship, one could slow-down, and stop where one liked. He was glad the members had taken advantage of the few notes he had given in framing a resolution on the subject to be forwarded to the quarters influential in this matter.

Votes of Thanks and One of Sympathy.

The Chairman proposed a vote of thanks to Mr. Cutler, accompanied with the resolution suggested by Mr. Scott and Mr. West.

Mr. Archibald P. Main, in seconding, pictured the time when through carriages from Charing Cross would be labelled not only London to Bagdad, but Bombay, Calcutta, Petrograd, Pekin, and Shanghai. He believed that the Channel Tunnel would give this country an enormous expansion of trade. In their business transactions abroad, the manufacturers of this country had often suffered on account of transport.

The resolutions were unanimously carried.

On the motion of Alderman F. Templer Depree, J.P., a vote of thanks was passed to the Chairman not only for his conduct in the chair, but for the work he had done in the interests of the members during the half year.

Moved by Mr. C. A. Goodall, and seconded by Mr. J. W. Broadhead, a vote of sympathy with the President (Sir Robert Hadfield) was passed, together with best wishes for his speedy recovery.

Tea was afterwards served.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

Sliding-Scale Injustice.

Sir,—In the letter appearing in your last issue on the above subject, Mr. Upton quotes the concluding paragraph of my letter of the previous week, and states that the text of his letter is based on this quotation. He then proceeds to say: "The character of the sliding-scale, I suggest, not only lends itself to the application of fictitious principles, but asks for them."

May I point out that this is the first we have heard of "fictitious principles," and is an entirely different question from that of "fictitious application of principles," which is what is dealt with in the quotation. If Mr. Upton believes the principles stated to be fictitious, it would be interesting if he would himself say what the true ones are. At the same time, it might be as well if he would consider whether the cause for which we are both working is likely to be advanced by attacking principles hitherto accepted, which, if he will look into the matter carefully, I think he must see are themselves the best possible evidence of the injustice of the present situation.

Arthur Valon.

5, *Victoria Street, S.W., Oct.* 19, 1917.

Fuel Research.

Sir,—All connected with the gas industry will read with pleasure the determination of a Board presided over by Sir Geo. Beilby to erect a fuel research works on a true working scale; and the thanks of the profession are due to Mr. C. Carpenter, D.Sc., for the aid he and his Company are rendering in this matter.

This brings me to recall some passages in my Presidential Address to the Institution of Gas Engineers in 1899; and perhaps it may be of interest to quote them. I said:

> Closely allied to the education of the gas engineer is another question I beg leave to submit to you, and that is the idea of instituting a National British Gas Laboratory and Experimental Gas-Works.
>
> Our industry is perhaps one of the wealthiest; and we cannot plead want of means.
>
> At this laboratory and gas-works students would be educated, and experiments and research in the higher branches of gas physics and chemistry be carried out under the daily and constant direction of our ablest professors, who have made the gas science their own.
>
> I am stirred to appeal to you on this matter (which has been uppermost in my mind for many years) by what is being done by the local Chemical College at Nottingham.
>
> If the gas industry is to be lifted to the scientific level of other kindred industries, it can only be by means of patient research conducted on well-defined lines, and not by sporadic individual effort; for it cannot be expected that men who are weighted by mind-wearing responsibility involved in the management of a large undertaking should devote the time necessary to chemical research.

I then referred to the gratitude we all felt for the endeavours of the men of science who had helped us in the past—Letheby, Fewtrell, Wills, Vivian Lewes, Prof. Clowes, and others; but I made an important omission which troubled me much afterwards, and that was the debt of gratitude we certainly owed to the enterprise, energy, and capital expenditure of the large group of manufacturers of gas appliances and machinery, which had so much contributed to the success of our enterprise.

I never quite realized until I left my strictly professional sphere what we owed to the Dempsters, John West, Jenkins, Cowans, Walkers, Kirkham-Hulett, and many other world-famous names, for the great part they have played in developing the gas industry. I have always considered that the late Sir Geo. Livesey did the industry a great disservice when, by sheer force of will, he succeeded in separating the sheep from the goats, meaning the so-called contractors and manufacturers from the professional gas managers and engineers.

My long residence on the Continent, where I was associated with

Institutions kindred to the "Institution of Gas Engineers," brought this very vividly before me; and the Continental Unions of manufacturers and professional men amply justified the application of the grand Belgian National motto that "*Union fait la force.*"

Views will naturally differ; and although many clever and epoch-making ideas have certainly emanated from the brains of the professional gas engineer, I think it will be admitted that it is due to the capital and enterprise of the manufacturers that these ideas have borne commercial fruit. The contractors and manufacturers nowadays are really the consulting engineers of the profession. Their very business catalogues, prepared at great cost, are a *vade mecum* not only to the operating gas engineer, but likewise to the constructing engineer.

And so it will be if this National Fuel Research Scheme is ever to bear fruit (that is, as far as the gas-engineering profession is concerned). Even under the driving power of Sir G. Beilby and Mr. Carpenter, years must elapse before any concrete proposals can be put before the country; and then it will be the manufacturers who will reduce these proposals to commercial realities.

So far as fuel research is concerned, it is almost a pity that coal carbonization is to be considered alongside other coal problems—such as coking-ovens, boiler fuel, gas-producers, &c.—and I venture to think that it would have been better if the question of coal carbonization *quâ* gas-works had had its own organization supervised by the gas companies themselves (as I indicated in 1889) rather than that the question should have been thrown into the common pot; and this pot under the control of Government departmental chefs.

F. D. Marshall.

19, *Queen Anne's Chambers, S.W.* 1, *Oct.* 19, 1917.

Railway Companies and the Gas Industry.

Sir,—I was sorry to read your article this week on "Railway Companies' Pressure on Gas Undertakings." It is true, as you say, that gas undertakings are, in most cases, large customers of the railways; but it is true also that the railways are, in many cases, large (in some cases the largest) customers of gas undertakings. Do not then let us do anything to spoil the very happy relations that, generally speaking, exist between the two great industries, unless we are sure of our ground, and of the urgent necessity of taking-up an aggressive attitude.

From my knowledge of the facts, which is a fairly intimate one, I am satisfied that there is little (if any) occasion at present for any such feeling as that expressed in your editorial. It is not putting it quite fairly to say that the railways "are operating in collusion" (if it were gas companies we should say "were co-operating," should we not—"collusion" means secret co-operation for a fraudulent purpose!) "with a view to moulding gas-supply conditions on the lines they think desirable." The railway companies, whose consumption of gas is enormous, see that the question of the future quality and constitution of gas is being considered by Parliament and the Board of Trade. They have made the question of the lighting efficiencies of various gas-burners and pressure systems, the comparative costs of gas and electricity, and the effects upon efficiency of varying calorific values and pressures of gas, the subject of careful study, as few other gas users have the facilities for doing. Is it really unreasonable of them to submit their views on the subject jointly and publicly to the Board of Trade? Has the gas industry so little confidence in its own policy, or in the sense and justice of the Board of Trade, that it must treat the reasonable criticism of very much interested parties as unjustifiable interference?

Considering the amount of all-night work which railway companies have to do, which means that too great a drop in night pressures puts them to serious disadvantage, are they unreasonable in asking for a minimum of 20-10ths at the meter inlet—a minimum well below that which every well-managed undertaking is already giving them as a matter of course? Considering the amount of gas they use, is it unreasonable that they should have some security that they will get—not now, but after the war—the quality specified by law?

If we object to their having a voice in the quality of the gas they are purchasing, in the pressure at which it is supplied, and in the means of determining whether they are getting the specified quality, should we be better pleased—but ought we to be surprised—if they as a consequence went across the street to our competitors who are always trying to get the business?

I know it can be urged—and it is a good debating point—that the railways are open to much criticism in regard to their own service to the gas industry, and that we have no ready means of checking and penalizing them. But two blacks don't make a white; and it is for us to combine to get redress if we have grievances, not to object to the railways looking after their interests in an open and by no means intentionally aggressive fashion. Nor is it for the whole industry to espouse the cause of a few gas undertakings that understand their business so ill that they do not try to supply what their customers need, but rather to sell what they choose to make at such pressure as they choose to give.

As to the question of half-yearly accounts and payment, your criticism of the railways is surely answered by the fact that over a hundred gas undertakings have readily acceded to a purely voluntary arrangement designed solely to minimize work in war time and inflicting no financial hardship whatever. If payment for one quarter's consumption is somewhat delayed by this arrangement that for the next is greatly expedited, as the half-year's account is paid within a few days of being rendered; and on balance throughout the year there is nothing whatever in it, except saving of work for both sides.

For heaven's sake don't let us get up quarrels with good friends when no cause exists. We have enough else on our hands—and it is downright bad business anyhow.

Audi Alteram Partem.

Oct. 20, 1917.

The "Captive Fire" Controversy.

Sir,—Mr. Clark presumes too much. My statement in the paper written for the Institute of Metals is as follows: A light worked by means of a pressure-balance feeding a small incandescent mantle will produce 130 to 150 c.p., with a consumption of under 3 c.ft. per hour of town gas of standard calorific value; whereas, it can be stated on the authority of Mr. J. G. Clark ["Journal," May 4, 1915] that the highest candle power light obtainable at this pressure by other systems *averages* 22 c.p. per c.ft. of gas consumed—variable, of course, owing to the atmospheric burner.

Of course, Mr. Clark was only responsible for the curves published in the "Journal," for May 4, 1915. But by subsequent fatuities he has placed himself in the unenviable position of having to prove that the average candle power at that pressure is greater than 22, or he stands convicted of having wrongfully accused another of a misstatement.

It is difficult to ascertain what has prompted the letter from the Selas-Turner Company, in your issue of the 16th inst.

Besides raising points which nobody questions, the Selas-Turner Company made the fallowing statement: "Our apparatus gives equal efficiency at a pressure of 1-in. water column, as with higher pressures." In this case, the burden of proof rests with them. It has not been found so with the "Captive Fire."

And, as they state that they usually operate at 10-in. water-gauge, and omit their reasons for this preference, their silence, to those familiar with the possibilities connected with putting explosive mixtures into pipes, is the most eloquent part of their letter.

Alex. C. Ionides, Jun.

34, *Porchester Terrace, W., Oct.* 19, 1917.

Sulphate Prices.

Sir,—With reference to your quotation for sulphate of ammonia in your issue of the 16th inst., please note that the agricultural prices are "on the basis of 24½ p.ct., and in single bags," not "basis 25 p.ct., and double bags," as stated. Perhaps you will be good enough to correct this.

Sulphate of Ammonia Association.
G. C. O. Speyer, Export Manager.

84, *Horseferry Road, S.W., Oct.* 19, 1917.

Connections for Gas-Driven Motors.

Sir,—Adverting to the specification *re* standardizing connections for gas-driven motors in your issue of the 9th inst., I have been in communication on the matter of standard connections with a Traction Company near here; and the following is an extract from a letter received from them: "We are advising our clients to carry reducing connections from 2 in. to 1 in., also about 6 ft. of hose pipe."

Thos. Dann.

Bedford, Oct. 16, 1917.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official Journal" for Oct. 17.]

Nos. 14,495—14,869.

Chinese-American Company.—"Producing gas." No. 14,850.

Hamblet, J.—"Production of hydrocarbon gas for power purposes." No. 14,505.

Lambourne, A. E.—"Compressed-gas installation for internal-combustion engines." No. 14,602.

Looker, J. G.—"Control valve for gas-bags of gas-driven vehicles." No. 14,843.

Martin, W. T.—See Lambourne. No. 14,602.

Morris, W.—See Hamblet. No. 14,505.

Muir, J.—"Container or cylinder for compressed gas." No. 14,846.

Pearse, A. L.—"Distillation of carbonizable materials." No. 14,725.

Saurer, A.—"Apparatus for automatically controlling temperature-regulators." No. 14,820.

Somerville, J. M., and the South Metropolitan Gas Company.—"Method of oxidizing carbon monoxide." No. 14,737.

Tankard and Smith.—"Gas carburettors." No. 14,635.

Warrick, J.—See Lambourne. No. 14,602.

Wilton, G.—"Distillation and recovery of ammonia from ammoniacal liquor." No. 14,745.

Wood-Milne, Ltd.—"Container or cylinder for compressed gas." No. 14,846.

Increased Price at Kilsyth.—The Kilsyth Town Council have decided to increase the price of gas 5d. per 1000 c.ft., making the cost 4s. 2d. to ordinary consumers, 4s. 4½d. through prepayment meters, and 3s. 11d. for power purposes. This makes the third increase since the war began.

Prices at Falkirk.—The Falkirk Town Council are the first corporation in Scotland to increase the charges for gas and electricity following upon the intimation by the Coal Controller of his sanction of 2s. 6d. per ton advance in the price of coal. For gas the Council have advanced the price 4d. per 1000 c.ft., making two increases (of 7d. in the aggregate) within a month. For electricity, the charges are also increased. Should further increases require to be made during the currency of the quarter, the Council reserve power to make alterations retrospective from the beginning of the quarter.

Price of Gas at Hull.—The Hull Corporation Gas Committee have decided to advance the price of gas from 2s. 6d. to 2s. 8d. per 1000 c.ft., as from Jan. 1 next. This advance has been necessitated by formal notice from the British Gas Light Company of an increase in the price of gas supplied in bulk to the Corporation from 1s. 9d. to 1s. 10d. per 1000 c.ft. as from Oct. 1, and a deficit of £283 on the gas undertaking last year, which is equivalent to another 1d. The Corporation supply gas within a circumscribed area known as the Old Town. The price for the remainder of the city, supplied by the British Gas Light Company, is 2s. 4d. per 1000 c.ft.

MISCELLANEOUS NEWS.

AUSTRALIAN GAS LIGHT COMPANY.

The Dividend Passed.

At the meeting of the Company on Aug. 30, a financial statement for the half year ended June 30 was submitted which showed a net profit of £39,494, which, with £15,429 brought forward, made £54,924 available. The earnings for the period mentioned compared with £51,525 for the December half, and with £53,398 for the first half of 1916. The Directors, in their report, expressed regret that they could not recommend the payment of a dividend, as "in consequence of the provisions of the Gas Act of 1912 it is not possible to obtain further necessary capital." They contended that it was their duty to conserve all the resources of the Company, including surplus revenue, "so that the supply of gas to the public may be maintained, even though this involves a temporary hardship on the shareholders." Twelve months ago the Company paid a dividend at the rate of 7 p.ct. on the ordinary and 6 p.ct. on the "C" shares.

The meeting was presided over by the Chairman (Mr. G. J. Cohen), who said he regretted that at this meeting, on the eightieth anniversary of the Company, he was unable to announce the payment of the usual dividend. Through no fault of the Company or their employees, the gas industry had again been thrown into a chaotic condition; and heavy restrictions had been placed upon the consumption of gas in the city and suburbs. The continuous burdens which the Company had had to bear during the past few years, and the impossibility of obtaining additional capital in consequence of the onerous provisions of the Gas Act, 1912, had greatly impeded progress. The Directors were carefully considering what steps could be taken to relieve the position. In the meantime, they had to make use of revenue in order to meet as far as possible the demands of the public; and therefore they did not feel justified in recommending the payment of a dividend. The question was often asked how it was that, in crises such as the Company were now passing through, their stock of coal was inevitably short. It could easily be explained by the fact that the interval between strikes of late years had not been sufficiently long to enable the Company to replenish their stores. For instance, no sooner was the great coal strike over, in November last, than the coal-lumpers' strike occurred; and just as the Company were well on the road to fill up their stores, the present strike commenced. The coal requirements of the Company now exceeded 300,000 tons per annum, averaging about 1000 tons per working day, thus requiring very heavy freight and handling to get it on the works. To facilitate the latter, up-to-date machinery had been ordered, and but for the war would have been in use. This would have been of immense assistance to the Company at the present juncture. In addition to supplies from the contractors, the Company purchased 30,000 tons of coal many months ago from another company, but had not been able to obtain delivery of more than 400 tons, owing to freighting difficulties. He had had the pleasure, in May last, of putting into commission the new gasholder, which had been in course of erection for some time, and the total cost of which amounted to £188,000. Their storage capacity was thereby more than doubled. The many interruptions to business had necessarily interfered with the sale of gas, but not to any appreciable extent. The number of employees who had enlisted for active service now reached a total of 305, of which 22, he regretted to say, had lost their lives for the Empire. Of those who enlisted, 20 had returned to take up their former positions in the service, which were kept open for them.

The report was adopted, and subsequent formal business transacted.

APPLICATION OF COAL GAS TO COMMERCIAL VEHICLES.

A Lecture by Mr. W. A. Tookey.

The Friday evening gatherings of the Junior Institution of Engineers are usually well attended; and that of last week proved no exception in this respect, for there must have been an audience of over fifty at No. 39, Victoria Street, S.W., to hear Mr. W. A. Tookey, M.I.Mech.E. (the Secretary of the Institution), deliver a lecturette on the "Application of Coal Gas to Commercial Vehicles," and (in the case of many of them) to join in the subsequent discussion. The proceedings on these occasions are informal, but informative.

Mr. Tookey said that for a good many years vehicle owners had been looking for alternative fuels, because even before the war the price of petrol had been going up. The alternatives were but few. It would almost of necessity be a liquid fuel, because a liquid fuel was B.Th.U. in such a highly concentrated form. The benzol to be had from gas-works before the war was an infinitesimal quantity compared with the requirements for commercial vehicles alone. A petrol engine would not, without radical alteration, be suitable for consuming alcohol. Paraffin was tried, but it was found to be a very great nuisance, and to be almost utterly unsuitable as a fuel for internal combustion engines for road work. Then it became certain that during the war none of these liquid fuels could be utilized; and things seemed to have reached a dead-lock. But the motoring industry, and particularly the Press connected with it, had not been idle. Thirteen or fourteen months ago, the "Commercial Motor" began to anticipate that something would have to be done to procure alternative means of driving cars. The Editor searched all round until he came to coal gas, as to the usefulness of which for the purpose he was doubtful. He wrote to him (Mr. Tookey) for an expression of opinion, and this he (the speaker) gave in an article which appeared in July, 1916, before any practical

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IS A MARVEL OF

CONVENIENCE AND CHEAPNESS.

OUR special **"Anti-scale"** treatment completely overcomes the difficulty of lime deposit in hard-water districts. This means—

LONGER LIFE FOR THE BOILER.
CLEANING IS MADE QUITE EASY.
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WRITE TO US FOR FURTHER PARTICULARS.

JOHN WRIGHT & CO.,
ESSEX WORKS, ASTON,
- BIRMINGHAM. -

attempt had been made to put coal gas to use for commercial vehicles. In this article, attention was drawn to the good points about the use of coal gas; but for some months afterwards very little was done. When, however, it came to be tried on motor vehicles, success was almost immediate.

Now the petrol question had become so acute that it seemed the only way to keep motor vehicles on the road was to utilize coal gas for the purpose; and coal gas, apart from its disadvantages, had many advantages. It did not require any alteration in the design of the engine; it needed no higher compression; and there was no "knocking." As a matter of fact, one could start-up on coal gas, and continue to run on it; and if the gas-bag should become deflated, one could switch over to petrol, and notice practically no difference in the running of the engine. A fuel that would give this service was one well worthy of consideration by engineers, and not only during the war, because he thought that even after the war was over it would be a very long time indeed before petrol got down again to a price at which it would pay to revert to it from coal gas. Certainly, those cars that were now being equipped with any sort of container to hold coal gas would long continue to use this fuel, because, on the basis of a gallon of petrol being equivalent to about 250 c.ft. of town gas, the latter at 3s. per 1000 c.ft. was equal to petrol at 9d. per gallon.

Though not in a sense so important as commercial vehicles, private cars were, of course, of importance. Within the last few days, he had had to look into the question of whether it would not be possible to utilize producer gas on private cars for to-and-from-station runs in the case of those country houses which had their own electric light installations with suction gas plants attached. In spite of the known disadvantages of suction gas as compared with town gas, for such a purpose as he had named he thought there might be something in it. Naturally, the containers would have to be larger; for while the quality of town gas was from (say) 450 to 500 B.Th.U., that of producer gas was from 120 to 130 B.Th.U. But if one could get 20 miles out of 1000 c.ft. of town gas, it would under certain conditions be worth getting a quarter of this, or 5 miles, out of producer gas.

Quite lately there had been a remarkable demonstration at Thornycroft's Garage, in Grosvenor Road, S.W., showing what had been done of recent months in the connecting-up of coal gas to different types of cars, varying from the 6 and 8 ton gross weight omnibus down to the motor cycle, and from light delivery vans to landaulettes, and so on—all equipped with containers. The majority of these were nothing more than an inflated gas-bag; and some were little more than apologies for what they ought to look like. But, on the other hand, several of the cars were fitted with containers which were very decent indeed—of good cloth, of a suitable neutral colour, fitted to the vehicles in a workmanlike manner, and so arranged as to retain a somewhat rigid, and therefore presentable, appearance. The question of the container was one of the most important. It was impossible at the present time to obtain steel for any purposes other than those which were regarded favourably by the Ministry of Munitions; and the heavy weight of the ordinary gas-cylinders was against them. With highly compressed gas, of course, some readily controlled and simple method of pressure reduction was required; but he did not think this need worry engineers. Already, in the case of oxygen cylinders, it was known how to regulate the supplies of compressed gas from steel cylinders down to perhaps 10 lbs. per sq. in.; so that it was only one or two steps further to get the pressure down to a safe point for gas-engine work. This problem, however, was for the future. Another container just brought out was known as the Wood-Milne container, and was a cylinder about 15 in. diameter and 5 ft. long, of a weight which a man could carry easily in his arms. He believed, however, the rubber in these containers was something like 1½ or 2 in. thick, so that one could not contemplate them coming into general use at the present juncture. No doubt, for awhile they must be content to rely mainly upon the ordinary balloon-shaped bag; but there was a long way to go before they obtained a bag suitable for all purposes.

Next it was necessary to consider the filling of the container; how, when once filled, the gas should be piped to the engine; and what controls were necessary. The fittings in connection with the containers at this demonstration were generally speaking of a very simple character. The time taken in filling depended upon a number of factors. The containers so far used were of from (say) 230 to 950 c.ft. capacity; and it was found that, according to the size of the pipe and meter employed, so the time required for filling varied from perhaps 3 or 4 minutes with everything of a large size, to 10 or 14 minutes. This being so, there was plenty of time for something to go wrong. A man might make the connection, watch the bag for awhile, and then, having his attention directed to something else, fail to turn the gas off when he should, thus allowing the pressure in the bag to increase, with possible resultant damage to the tags fastening the balloon to the vehicle. It was necessary that the filling of the container should be carefully watched; and to provide against any unfortunate happening, it had been found requisite in the case of some users to have an automatic arrangement whereby, as the bag filled, a mechanical device was operated, and at the required degree of expansion a catch slipped out, a butterfly valve came on its seat, and nothing else happened. Such a fitting should be applied to every car. It was a very simple thing.

Cars at the demonstration had a gas-tap right in front of the driver, so that he could manipulate it; but there were not so many that had another fitting which seemed to him to be required, to save the gas between the stand-pipe or the connection to the main and the car itself. He thought an ordinary cock was not quite good enough. One wanted a sort of back-pressure valve, so that at the instant of undoing the connection, one could retain all the gas in the bag. For carrying the gas to the engine, flexible tubes were better than the ordinary iron barrel sometimes used, for they dispensed with unsightly elbows or tees. It was astonishing to find that so many variations had been made to pipe the gas to the engine. One good device was a sort of needle-valve connection which was placed close to the induction pipe

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THERE are many of them, of course, but have you studied the "St. Nicholas" types?

The "St. Nicholas" Gas Fire is a happy combination of the three essentials:

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Low in Price and Easy to Fit.

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article written by Mr. Helps against assuming that his coal price equivalent of 35s. a ton is a fair figure to take for our present working conditions. Coal in bunkers at 35s. a ton would certainly not represent the same duty as gas at an equal price per B.Th.U. To what extent banking-up and stand-by losses would be reduced, we are not prepared to say; they would shrink, but not altogether disappear. There would be large economies in labour, maintenance, and power for the coal-conveyor and ash system. There would be advantages resultant upon increased capacity. It has been pointed out before that, on high-load factors, it is precisely the coal-conveyor system that most baulks the power-house engineer, and sets a limit to his output. Nor does the tale end here."

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

London, *Oct.* 20.

In the tar products market, solvent naphtha continues to show great strength. There is considerable demand for the article, and supplies are scarce. The price is firm at from 3s. 3d. to 3s. 6d. per gallon net and naked at makers' works. The inquiry for pitch is also well maintained; but business rather depends upon the freight obtainable. In creosote and other tar products the position is unchanged.

The demand for sulphate of ammonia continues, and a fair number of orders are being placed for forward delivery through the Distribution Committee of the Food Production Department.

Tar Products in the Provinces.

Oct. 22.

The markets for tar products remain steady. Solvent and heavy naphthas are in great demand, and prices have risen considerably.

The average values for gas-works products during the week were: Gas-works coal tar, 26s. 3d. to 30s. 3d. Pitch, East Coast, 18s. to 20s. per ton; West Coast—Manchester 17s. 6d. to 18s. 6d., Liverpool 17s. 6d. to 18s. 6d., Clyde 18s. to 19s. nominal. Benzol, 90 p.ct., North 10½d. to 11½d.; 50-90 p.ct., naked, North, 1s. 3d. to 1s. 4d. Toluol, naked, North, 2s. 3d. Coal tar crude naphtha, in bulk, North, 7¾d. to 8¼d. Solvent naphtha, naked, North, 3s. to 3s. 1d. Heavy naphtha, North, 1s. 6d. to 1s. 8d. Creosote, in bulk, North, 3¾d. to 4d. Heavy oils, in bulk, North, 4¼d. to 4½d. Carbolic acid, 60 p.ct., East and West Coasts, 3s. 4d. naked. Naphthalene salts, 80s., bags included. Anthracene, "A" quality, 3d. per unit; "B" quality, 1½d. to 2d.

Manchester District Tar Prices.

The average price realized for tar in this district, based on the value of the products for the month of September, was 27s. 11d. per ton.

FROM A MARKET CORRESPONDENT.

Tar Products.

While the London quotation for pitch remains at about 48s. per ton f.o.b., the Provincial position has undergone further improvement, and several more lots have gone to France on the basis of 28s. per ton f.o.b. Newcastle. Rather less tonnage was available last week, and the freight to Rouen was 67s. 6d. per ton. There are still considerable difficulties in the way of extending the export business from the Provinces; but the outlook is decidedly more hopeful. Solvent naphtha has provided the outstanding feature of tar product markets during the week. The price has again advanced rapidly; spot being nearly 4s. per gallon. Apart from a heavy demand from the rubber trade coming upon an inadequately-supplied market, it is somewhat difficult to account for the rapid and persistent advance that has taken place in the past few weeks (the price has nearly doubled in this period); but some people state that large quantities are being utilized by motorists in substitution for petrol. This, however, is not a very acceptable explanation, as any solvent naphtha used would diminish petrol allowances, and no advantage would be gained. The movement is extending to heavy naphtha, which has reached 2s. per gallon during the week, compared with 1s. 7d. to 1s. 9d. a month ago. Cresylic acid is quietly firm at late rates. Benzol is nominal. The recently constituted Protection Committee are holding another meeting in a few days to report progress—if any. The Government still maintain strict control over creosote, but have not announced terms for supplies taken over. Aniline oil is dull; but naphthalenes continue to experience strong demand, especially for crudes of lower grades, which are unobtainable under £5 10s. per ton. Better qualities range up to £15 per ton; and refined is firm and without change. Other products remain as a week ago. The total value of coal tar products, not including dye-stuffs, exported during September was £319,337, bringing the value of such exports during the nine months to £2,368,772. During September, 1709 cwt. of tar products (not dye-stuffs), valued at £25,693, were imported, compared with 3914 cwt., valued at £48,321, a year ago. The range of quotations for last week is as follows:

Aniline Oil (pure): 1s. 3d. per lb.

Benzol: 90% London, 1s. 0½d., North 10½d. to 11½d.; 50% North 1s. 4d. to 1s. 5d. naked per gallon.

Carbolic Acid: 60% East and West Coast 3s. 6d. per gallon; crystals 40%, 1s. 3d. per lb.

Crude Tar: London 30s., Midlands 24s. 6d. to 25s. 6d.; North 25s. 6d. per ton, *ex* works.

Pitch: London 48s. f.o.b.; East Coast, 21s. to 22s. f.o.b.; West Coast—Liverpool and Manchester 21s. to 22s. f.a.s., Clyde 22s. per ton.

Solvent Naphtha: Naked London 90-190% 1s. 10d. to 2s.; North 1s. 6d. to 1s. 9d. per gallon; 90-160% naked London 3s. 6d. to 3s. 9d.; North 3s. 3d. to 3s. 6d. per gallon.

Crude Naphtha: Naked 30% 8¼d. to 8½d.; North 6¼d. to 6½d.

Naphthalene: Refined £32 10s. to £35; salts 80s., bags included.

"TAR FOG" & TAR EXTRACTOR
(FISHER-FIDDES PATENT)
SEE "GAS JOURNAL," JULY 3rd, 1917.

FOR THE
ELIMINATION OF
TAR & TAR FOG
FROM COAL GAS AND
OIL VAPOURS
FROM C.W. GAS
WHY NOT TRY THE
NEW METHOD
AUTOMATIC
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PARTICULARS AND PRICES FROM
R. & J. DEMPSTER, LTD., MANCHESTER.
LONDON OFFICES: CONNAUGHT MANSIONS, 34, VICTORIA STREET, WESTMINSTER, S.W. 1.

Toluol: Naked, London 2s. 4d.; North 2s. 3d.
Creosote: Nominal, London 4¼d.; North 3¾d.; heavy oil, 4½d. per gallon in bulk.
Anthracene: "A" quality, 40-45%, 4½d. per unit; "B" quality, 1¾d. to 2½d.
Cresylic Acid: 95%, 2s. 6d.; 97-99%, 2s. 6d. to 2s. 7d.; Glasgow 2s. 3d. *ex* works London and f.o.b. other ports.
Grease Oils 18° Tw. (naked), £6 per ton f.o.r. makers' works.

Sulphate of Ammonia.

Exports for September were 4691 tons, valued at £93,074. There is a heavy shipping demand; and it is said that some rather larger shipments are being arranged. In the main, however, exports are being kept down to a minimum in view of the home demand. This is shown by a comparison of the export figures for the first three quarters of the years 1915, 1916, and 1917, which were respectively 224,931 tons, 190,548 tons, and 51,213 tons. Makers express much dissatisfaction with export values, arguing that, in view of the price of other fertilizers, sulphate should be nearer £30 per ton. Across the Atlantic quotations are still higher; there being great scarcity in many parts, owing to the heavy demand in the Eastern districts. The restriction of British exports has diverted much business to the States, and manufacturers there, already fully occupied with their own domestic demands, have found themselves almost unable to cope with the new business offered. As pointed out before in these notes, this is a passing phase, as American production is increasing very rapidly—latest advices, indeed, indicate an easier tendency in the near future, as buyers are now showing much caution. At home here, sulphate is being produced in good quantities; and the trade remains very steady at the fixed prices. Orders for immediate, as well as forward, delivery are considered satisfactory.

Quotations (basis 24½ p.ct. single bags): October-December £15 15s. per ton, January-May, 1918, £16 7s. 6d. delivered; 10s. per ton less at makers' works. Export, £24 to £25 per ton f.o.b. London, Leith, Glasgow, Hull, or Liverpool.

German Gas Statistics.—According to the American "Gas Age," the gas-consuming population of Germany includes some 30 millions, who use 123,000 million c.ft. of gas per annum through 7 million meters, of which 2 million are on the prepayment system. Over 10 million tons of coal are required for the production of this quantity; and the residual products, stated in percentages, are 4·5 to 5·5 of tar, 1 to 1·4 of sulphate of ammonia, 0·35 of sulphur, and 1 to 1·2 of crude benzol.

STOCK MARKET REPORT.

Business on the Stock Exchange last week was on a quieter scale and more subdued in tone than the week before. The big competitor for the nation's money, the new War Bond issue, was rejoicing like a giant; and the published figures showed a most successful start. Then, the markets were without the stimulus of one of "Haig's pushes," which, so long as the weather lasted, had been so rapid and continuous as almost to create a weekly expectation. Moreover, there was the antagonistic influence of the plight of unhappy Russia strangling in the hands of democracy gone mad. So it would not have been surprising had markets been weak, which they were not.

Home Government were quite firm. The 5 p.ct. War Loan was repeatedly done at 95 7/16 on Wednesday, Consols rose a bit, and the rest were steady. Home Rails reacted from their free advance, but showed signs of recovery at the close. Americans and Canadians also finished up better. Argentines were firmer on favourable reports. The Foreign Market was rather quiet. French Loan was in good odour, and Chinese and Japanese were steady. But Russian and Scandinavian were lower. Among the Miscellaneous lines, there was activity, and some of the more speculative adventures were conspicuous. Coalite concerns were noticeably in evidence; but the motive power was not quite apparent. Rubber was fair to middling, rather jerky at times; but Oil was in steady demand. Breweries numbered many friends, and Textiles and Shipping were in favour.

Business in the Gas Market was not quite so active as it was a week ago; but there was no very great falling off. The bulk of it was in the two larger Metropolitan undertakings. The general tendency all round was quite favourable; and the prices recorded and quotations varied were in the upward direction. Alliance and Dublin rose 4, and lesser gains were made by Commercial, both Liverpools, Southampton, and Monte Video; while, in some instances, issues changed hands at advanced figures, though quotations remained unchanged. The Money Market showed pronounced ease.

Bargains done for cash during the week were as follows: On Monday, Brentford "B" 76½, Commercial 4 p.ct. 71, Gas Light ordinary 68⅛, 68¼, 68⅜, 69, 69⅛, 69¼, ditto debenture 56½, Imperial Continental 90½, Primitiva preference 57s. 6d., 60s., South Metropolitan 73½, 73⅝, 74, 74½, 74⅝. On Tuesday, Continental Union 39½, Gas Light ordinary 68¼, 68⅜, 68½, 69, 69⅛, 69¼, ditto maximum 57½, Imperial Continental 89¼, 90⅛, Monte Video 7 15/16, Primitiva 40s., South Metropolitan 74, 74½. On Wednesday, Brentford "A" 79½, ditto "B" 76½, Commercial 4 p.ct. 71⅞, ditto debenture 52¼, Gas Light ordinary 69¼, ditto maximum 58, Monte Video 8, Primitiva preference 58s. 1½d., South Metropolitan 73½, Tottenham "B" 70. On Thursday, Brentford "A" 79½, 80, ditto "B" 76, Gas Light ordinary 68¼, 69, 69½, ditto preference 70½, 71¾, Imperial Continental 89⅜, Liverpool 82¾, Primitiva debenture 78½, 78⅝, South Metropolitan preference 95, ditto debenture 56, 56¼. On Friday, Alliance and Dublin 60, Brentford "B" 77, 77¼, Commercial 3½ p.ct. 64½, ditto debenture 51½, 53, Gas Light ordinary 68⅜, 69, 69⅛, 69½, 69¾, ditto maximum 56½, ditto preference 73½, ditto debenture 55½, Imperial Continental 90, San Paulo 7⅞, South Metropolitan 73½, ditto debenture 55½, 56¼.

The Bank rate is 5 p.ct., as fixed on April 5.

ANTE-WAR PRICES AND DIVIDENDS, LATEST DIVIDENDS, AND LAST WEEK'S BARGAINS.

Issue. £	Share.	When ex-Dividend.	Prev. Div. on Inv. & Bo-us. p.c.	Last Dividend.	NAME.	Closing Prices. July 30, 1914.	Present Prices	Lowest and Highest Prices of Bargains.
175,472	Stk.	Mar. 10	4	4%	Aldershot 4 p.c. Pref.	..	57—62	..
1,551,868	,,	April 8	2½	4⅛%	Alliance & Dublin Ord.	59—64	52—57	..
874,000	,,	July 10	4	4%	Do. 4 p.c. Deb.	76—79	57—62	60
280,000	5	April 29	7½	3/6	Bombay, Ltd.	5/—6/	4⅞—5/*	..
50,000	10	Feb. 26	16	14%	Bournemouth Gas and Water: 10 p.c.	29—30	23—25	..
383,110	10	,,	7	7%	Bournemouth Gas and Water: B 7 p.c.	15—15½	10½—11	..
115,000	10	,,	6	6/-	Bournemouth Gas and Water: Pref. 6 p.c.	13½—14	9—9½	..
159,740	—	—	—	4%	Bournemouth Gas and Water: 4 p.c. Deb.	..	69—71	..
992,045	Stk.	Feb. 26	14	5⅛%	Brentford A Consolid.	261—266	79—83	79½—80
734,920	,,	,,	11	4⅛%	Do. B New	204—209	76—79	76—77½
55,000	,,	,,	5	5%	Do. 5 p.c. Pref.	109—111	81—86	..
221,400	,,	June 11	4	4%	Do. 4 p.c. Deb.	91—93	65—67	..
217,880	,,	Feb. 26	11	10%	Brighton & Hove Orig.	208—213	145—150	..
244,200	,,	,,	8	7%	Do. A Ord. Stk.	154—159	98—103	..
580,000	20	Mar. 26	12½	22/6	British	44—45	32—33	..
120,000	Stk.	June 26	4	4%	Do. 4 p.c. Deb. Stk.	88—90	68—70	..
245,771	,,	,,	4	4%	Buenos Aires 4 p.c. Deb.	85—87	53—56	..
100,000	10	—	—	—	CapeTown & Dis., Ltd.	1½—2½	3—3½	..
100,000	10	—	—	4⅛%	Do. 4½ p.c. Pref.	4—6	6½—7½	..
100,000	Stk.	June 26	4½	4⅛%	Do. 4½ p.c. Deb. Stk.	70—75	60—65	..
157,150	,,	Feb. 26	5	5%	Chester 5 p.c. Ord.	108—110	78—79	..
1,518,280	,,	Feb. 12	5/9/4	44/-	Commercial 4 p.c. Stk.	106—108	70—72	71—71⅞
560 000	,,	,,	5½	40/-	Do. 3½ p.c. do.	103—105	64—66	64½
475,000	,,	June 11	3	3%	Do. 3 p.c. Deb. Stk.	69½—71½	52—54	51½—53
900,000	,,	,,	4	—	Continental Union Ltd.	76—79	39—41	39½
200,000	,,	,,	7	—	Do. 7 p.c. Pref.	115—118	61—63	..
278,400	—	—	—	11½%	Croydon B and C 7 p.c.	..	165—175	..
—	—	—	—	10%	Do. E	..	..	..
492,270	Stk.	—	6	5½%	Derby Con. Stk.	123—125	95—100	..
55,000	,,	—	4	4%	Do. Deb. Stk.	102—104	80—83	..
1,002,180	10	July 29	10	5/0	European, Ltd.	17½—18	10½—11½	..
16,313,430	Stk.	Feb. 10	4/17/4	37/4	Gas Light and Coke: 4 p.c. Ord.	98—102	68—70	6⅛—60⅞
2,600,000	,,	,,	3½	3½%	Gas Light and Coke: 3½ p.c. max.	76—79	56—58	56½—58
4,062,235	,,	,,	4	4%	Gas Light and Coke: 4 p.c. Con. Pref.	96—99	70—72	70½—73½
4,674,850	,,	June 11	3	3%	Gas Light and Coke: 3 p.c. Con. Deb.	72½—74½	55—57	55½—5 ½
130,000	,,	,,	10	10%	Gas Light and Coke: 10 p.c. Bonds	..	..	..
258,740	,,	Mar. 12	5	3⅛%	Hastings & St. L. 3½ p.c.	87—89	48—53	..
70,000	10	April 29	11	6%	Hongkong & China, Ltd.	16½—16½	7½—8½	..
26,600	—	—	—	9%	Hornsey 7 p.c.	..	115—125	..
131,000	Stk.	Mar. 12	7½	7%	Ilford A and C.	151—154	92—97	..
65,780	,,	,,	6⅜	5⅛%	Do. B	115—118	72—77	..
65,500	,,	June 26	4	4%	Do. 4 p.c. Deb.	92—94	65—68	..
4,940,000	,,	May 14	9	4½%	Imperial Continental	150—160	89—92	89½—90½
1,235,000	,,	Feb. 12	3½	3½%	Do. 3½ p.c. Deb. Red.	84—86	65—67	..
235,242	,,	Mar. 12	6½	6½%	Lea Bridge Ord. 5 p.c.	119—121	82—87	..
2,498,905	,,	Feb. 26	10	5%	Liverpool 5 p.c. Ord. A	211—213	82½—83	2⅞
					Liverpool 5 p.c. Ord. B	146—148		
306,083	,,	June 26	4	4%	Do. 4 p.c. Pr. Deb. Stk.	..	71—73	..
75,000	5	June 11	6	2/-	Malta & Mediterranean	4½—4⅝	3½—4	..
250,000	100	April 1	4½	4½%	Met. of Melbourne 4½ p.c. Deb.	99—101	88—98	..
541,920	20	May 28	4	6/-	Monte Video, Ltd.	11½—12	7⅜—8½	1 7/16—8
1,875,892	Stk.	July 29	4½	4½%	Newcastle&Gatsh'dCon.	98½—99½	71½—72½	..
529,705	,,	June 26	3½	3½%	Do. 3½ p.c. Deb.	82—83	61—63	..
55,940	10	Feb. 26	7/14/0	7%	North Middlesex 7 p.c.	14—15	9½—10½	..
300,000	Stk.	May 14	8	8%	Oriental, Ltd.	117—122	104—106	..
60,000	5	Mar. 26	10	1/-	Ottoman, Ltd.	7½—7⅞	2—3	..
60,000	50	Feb. 26	13	12%	Portsea, Island B	128—131	83—88	..
100,000	50	,,	12	11%	Do. C	118—121	73—78	..
52,000	50	,,	10	9%	Do. D	..	..	..
249,980	5	April 29	8	—	Primitiva Ord.	5⅛—6	2—2⅜	40/-
499,960	5	June 26	5	2/6	Do. 5 p.c. Pref.	4⅞—5	2⅞—3⅛	57/6—60/-
521,600	100	June 2	4	4%	Do. 4 p.c. Deb.	91—93	78—80	78½—78⅞
—	—	—	—	4%	Do. ,, ,, 1911	..	..	..
346,198	Stk.	June 26	4	4%	River Plate 4 p.c. Deb.	85—87	59—64	..
150,000	10	May 14	6	6/-	San Paulo: 6 p.c. Pref.	10½—11	7½—8	7⅞
125,000	50	July 1	5	5%	San Paulo: 5 p.c. Deb.	47—49	40—42	..
135,000	Stk.	Mar. 12	10	10%	Sheffield A	223—224	186—184	..
209,984	,,	,,	10	10%	Do. B	223—224		
533,500	,,	,,	10	10%	Do. C	220—222		
90,000	10	May 28	9	6/-	South African	10½—11½	8½—9½*	..
6,609,895	Stk.	Feb. 10	5/4/0	46/8	South Met. 4 p.c. Ord.	111—113	73—75	73½—74⅞
—	—	—	—	—	Do. Pref.	—	—	95
1,895,445	,,	July 10	3	3%	Do. 3 p.c. Deb.	72½—74½	55—57	55½—56½
224,820	,,	Feb. 26	8½	7⅛%	South Shields Con. Stk.	157—159	127—129	..
953,795	,,	,,	6	4⅛%	S'th Suburb'n Ord. 5 p.c.	114—116	75—77	..
60,000	,,	,,	5	5%	Do. 5 p.c. Pref.	110—112	75—77	..
135,000	—	—	—	4⅛%	Do. West Kent	..	..	..
187,558	Stk.	June 26	5	5%	Do. 5 p.c. Deb. Stk.	116—118	86—88	..
647,740	,,	May 14	5	5%	Southampton Ord.	99—102	76—78	..
120,000	,,	Feb. 12	7½	5⅛%	Tottenham: A 5 p.c.	135—138	92—97	..
782,275	,,	,,	6	4%	Tottenham: B 3½ p.c.	115—117	66—71	70
181,355	,,	June 26	4	4%	District: 4 p.c. Deb.	87—89	63—65	..
182,380	10	Dec. 30	5	—	Tuscan, Ltd.	5—6	1—2	..
149,900	10	July 1	5	5%	Do. 5 p.c. Deb. Red.	93—95	60—65	..
230,476	Stk.	Mar. 12	5	5%	Tynemouth 5 p.c. max.	103½—109½	89—91	..
					Wandsworth, Wimbledon, and Epsom—			..
80,000	,,	Feb. 26	8⅜	72/6	Wandsworth A 5 p.c.	151—156	112—117	..
255,636	,,	,,	6¼	57/6	Do. B 3½ p.c.	129—134	97—99	..
108,075	,,	,,	5/17/8	50/9	Do. C 3½ p.c.	110—115	84—89	..
352,000	,,	,,	6¼	51/3	Wimbledon 5 p.c.	117—123	85—90	..
98,000	,,	,,	6⅜	57/6	Epsom 5 p.c.	121—126	93—98	..
88,416	,,	June 26	3	3%	3 p.c. Deb. Stk.	66—69	50—53	..

* Ex Div.

South Staffordshire Mond Gas (No. 2) Bill.—Last Thursday, in the House of Lords, the South Staffordshire Mond Gas (Power and Heating) (No. 2) Bill was read a second time, according to order.

Rise in Price at Beverley.—After receiving from their Gas Manager a draft statement of accounts for the year ended March 31 last, the Beverley Town Council have approved an advance in gas charges from 2s. 8½d. to 2s. 11d. net per 1000 c.ft., as from Sept. 25.

Higher Price to Meet Extra Coal Cost at Newcastle.—Following upon the Order of the Board of Trade dated the 12th inst., increasing the price of coal 2s. 6d. per ton, the Directors of the Newcastle-upon-Tyne and Gateshead Gas Company have raised the price of gas 4d. per 1000 c.ft., to meet the increased cost of the coal from September to June under existing contracts.

Effect of Inferior Coal at Arbroath.—The Arbroath Gas-Works are using 25 p.ct. more retorts, owing to the inferior quality of coal obtained from the restricted area fixed for them by the Coal Controller. As the result of complaints from several corporations, an expert has been appointed to look into the matter; and he will visit Arbroath. The yield of gas has decreased 2000 c.ft. per ton of coal.

Loss at Sedgley.—The Gas Committee of the Sedgley Urban District Council have issued a report stating that the balance-sheet in many respects left much to be desired; but the year had been difficult for gas undertakings generally. Owing to the operation of the Summer Time Act and the Restricted Lighting Order, the sale of gas was less by 5,000,000 c.ft. Coupled with this, the increased cost of all materials, and the expense of mains renewals, resulted in a loss on the year's trading of £431. The gas unaccounted for showed a further increase, and had reached a most unsatisfactory level.

The Coal Situation in Canada.—Judging from the report of the Executive Committee, presented at the recent meeting of the Canadian Gas Association in Toronto, the difficulties experienced by gas undertakings in the matter of coal supply appear to be much of the same character as in England; but the industry has received more sympathy and consideration from the Government. A communication has been addressed to the Chairman of the Railway Commission, calling attention to the seriousness of the position, and urging that railway companies should be positively forbidden to confiscate coal consigned to Canadian gas-works. The Committee have also taken up the question of war tax on imported coal for gas-making purposes, and pointed out that, whereas at first the 7½ p.ct. duty on bituminous coal amounted to 4½d. per ton, on account of the enormous subsequent increases of price it is now nearly 1s. 8d. per ton. A deputation that waited on Sir Thomas White, the Minister of Finance, met with a very cordial reception, and a promise of serious and sympathetic consideration.

Price Raised at Normanton.—The Normanton Gas Company have announced that, owing to the recent further advance in the cost of coal and the heavy increase in charges for meter repairs, the price of gas is advanced 4d. per 1000 c.ft. through ordinary meters; while meter-rents will be increased by varying amounts, according to sizes. The quantity of gas supplied through prepayment meters will be reduced 2 c.ft. per 1d., from the date of the next reading.

Labour Difficulties at Ventnor.—Notice has been given by Mr. J. S. Ineson, the Managing-Director of the Ventnor Gas and Water Company, that the Company, having lost so many men owing to war requirements, and having used without result every means to secure fresh labour, find it almost impossible to properly carry on the manufacture of gas. Though, therefore, every endeavour is being made to keep up the supply, it may have to be considerably curtailed. The Company are now reduced to four men only.

The Birmingham Gas Department announce the sale of gas coke at the Windsor Street works, for 5 cwt. lots and upwards, at 24s. per ton, less 2½ p.ct. for cash; smaller quantities, 7½d. per ½ cwt. net.

The Huddersfield Gas Committee have decided upon fitting up a charging station at the gas-works for supplying gas for motor vehicles, at 4d. per 100 c.ft., with an additional charge of 6d. for filling between certain hours.

Mr. Thomas M'Dougall, the Engineer and Manager to the Banff Gas Company, has been complimented on the result of his efforts during the year, and his salary has been raised. During the two years he has been at Banff, the price of gas has not been increased, notwithstanding the higher cost of material.

A gas poisoning tragedy occurred at Bradford last week; a widow named Matilda Atkinson (aged 43) and her son Eric (aged 13) being found dead in bed at their home. The gas-jet in the room was turned full on, and the door and window were closed and the fireplace stuffed with paper. Mrs. Atkinson had been in straitened circumstances. A verdict of "Murder and suicide during temporary insanity" against Mrs. Atkinson was returned at the inquest.

Recent re-adjustments at Burton-on-Trent, which have already been referred to in the "Journal," have brought the war bonuses and war wages up to £3000 per annum, or 2d. per 1000 c.ft. on the cost of gas. Speaking in the Council, Alderman Rowland pointed out that the Gas Committee found it possible to grant £7000 to the rates without increasing the cost of gas and electricity; and there would be no additional burden on the consumer of gas or electricity for light and power.

WANTED, FOR SALE, CONTRACTS, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Appointments, &c., Vacant.

Gas Manager and Water Engineer. Spalding Urban District Council. Applications by Oct. 31.

Junior Chemist. Manchester Gas Department. Applications by Nov. 2.

Leading Stoker. No. 6368.

Assistant Foreman (Brass Shop). No. 6371.

Appointments, &c, Wanted.

Assistant Engineer or Manager. No. 6369.

Cashier or Chief Clerk. No. 6366.

Plant, &c. (Second-Hand) Wanted.

Purifiers. No. 6370.

Rotary Washer. Grays and Tilbury Gas-Works.

Meeting.

Ceará Gas Company. No. 9, Queen Street Place, E.C. Oct. 26. One o'clock.

TENDERS FOR

Tar and Ammoniacal Liquor.

Slough Gas Company. Tenders by Nov. 8.

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See Illustrated Advertisement Feb. 20, p. III. of Centre.

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